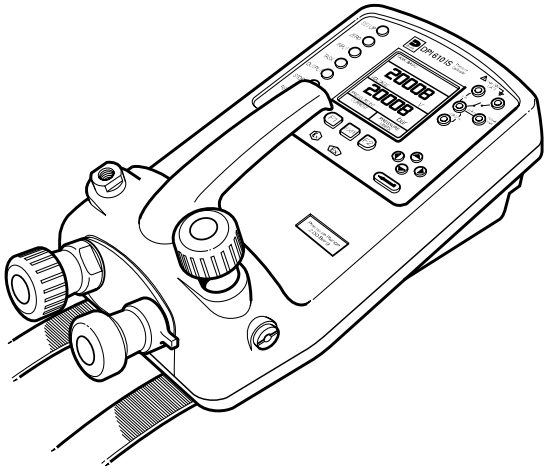
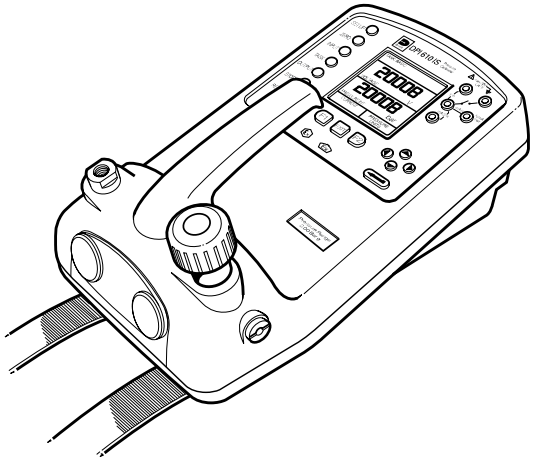
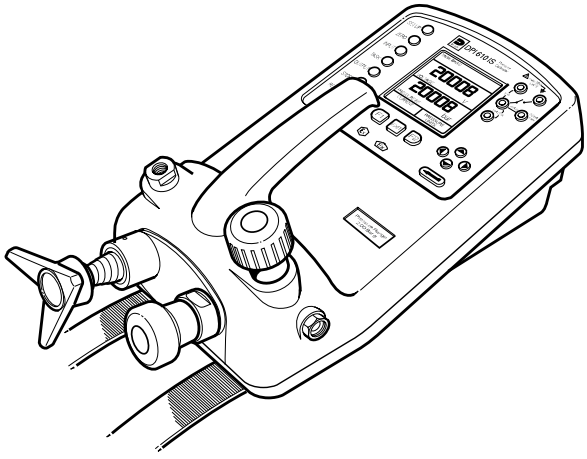
DPI 610 IS
PORTABLE PRESSURE CALIBRATOR/INDICATOR
USER GUIDE
K239



Calibrator Version



Indicator Version



Hydraulic Calibrator Version

DPI 610 IS Portable Pressure Calibrator

Software version 1.XX

INTRINSIC SAFETY CONDITIONS OF USE

This instrument is designed to be intrinsically safe when operated in accordance with the BASEEFA Certification document and schedule (see Appendix 2).

BASEEFA Certificate of Conformity No. Ex 99E2002X

BASEEFA being an Approved Certification Body, in accordance with Article 14 of the Council Directive of the European Communities of 18th December, 1975 (76/117/EEC) certifies that the apparatus has been found to comply with harmonised European Standards:

EN 50014: 1992
EN 50020: 1994 **EEx ia IIC T4**

and has successfully met the examination and test requirements recorded in confidential report Number,

98(C)0818 (ERA Report Ref.3627/856), dated January, 1999

NOTE: Attention is drawn to Pages 4/5 of the Certificate of conformity for electrical connection parameters

SPECIAL CONDITION OF USE

The DPI 610 IS Series Pressure calibrator is NOT capable of withstanding the 500V r.m.s. electric strength test between the external connectors and the frame of the apparatus as required by Clause 6.4.12 of EN50020 and this must be taken into account when using the apparatus for input measurements in a system.

SAFETY

The Manufacturer has designed this product to be entirely safe when operated correctly.

- Please pay close attention to the Safety Instructions outlined on this page and elsewhere in this manual. They have been designed to protect the user from personal injury and the equipment from damage.

Potentially hazardous operations are indicated in the text by means of a hazard warning triangle. Specific warnings relating to each section of the manual are given at the beginning of that section. On the instrument, this symbol indicates that the user should refer to the User Manual.

- Please observe the installation advice and any operational limits given in this manual.

- This equipment must only be used for the purpose for which it was designed

Electrical Safety

The instrument is designed to be completely safe when used with options and accessories supplied by the manufacturer for use with the instrument.

Test leads

Only use the test leads supplied with this instrument; the test leads must not be used with any other test equipment.

Toxic Materials

No toxic materials are employed in this equipment

Repair and Maintenance

The instrument must be maintained, either by the manufacturer or a competent person. Please refer to supplier for details of approved service agents. A list of Druck Subsidiaries who will be able to assist and advise is given on Page 38.

Software Issue

This guide contains operating instructions for instruments with software Version 1.XX.

CE

This product meets the essential protection requirements of the relevant EEC directives. Further details of applied standards may be found in the product specification.

WARNING This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Specification

Pressure Ranges (Internal Transducers)

Accuracy

Combined non-linearity, Hysteresis and repeatability

70 mbar to 20 bar (Calibrator):	0.025% F.S.
35 bar to 700 bar (Indicator):	0.025% F.S.
70 bar to 400 bar (Hydraulic)	0.025% F.S.

Temperature Effects

±0.004% of reading/°C (averaged over -10° to -40°C w.r.t. 20°C)

Electrical Parameters

Voltage Inputs

Range:	±30V
Accuracy	±0.05% rdg, ±0.004% F.S.
Resolution	100µV max

Current Inputs

Range:	±55mA
Accuracy	±0.05% rdg, ±0.004% F.S.
Resolution	1µA max

Current sink

Range:	24 mA
Accuracy	±0.05% rdg, ±0.01% F.S.

Display

Size:	60x60 mm LCD Graphics
Reading	±99999, update rate 2 readings/sec

Environmental

Operating Temp.:	-10°C to 50°C (Calibrated -10°C to 40°C)
Storage Temp:	-20°C to 60°C
Calibration Temp:	21°C ±2°C

Sealing

Sealed to IP54

Physical

Size:	300 x170x140 mm
Weight:	3 kg

Contents

Contents (Contd.)

Contents (Contd.)

Notes

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INTRODUCTION Summary of Functions

General

The DPI 610 is a rugged, portable precision instrument available either as an indicator or calibrator for use in hazardous areas. Additionally, an intrinsically safe hydraulic calibrator version (HC) is available.

The instrument is primarily used for calibrating instrumentation and systems over the range -1 to 20 bar, (HC version to 400 bar). Used in conjunction with external transducers, the range of the standard calibrator/indicator can be extended up to 700 bar.

The instrument is also capable of sinking an externally supplied current loop up to a maximum current of 24 mA and measuring dc input voltages of ± 30V and dc currents of ± 55 mA. Ambient temperature measurement is also provided.

The DPI 610 is powered by six alkaline C-cells and has an RS232 interface.

Important Notice

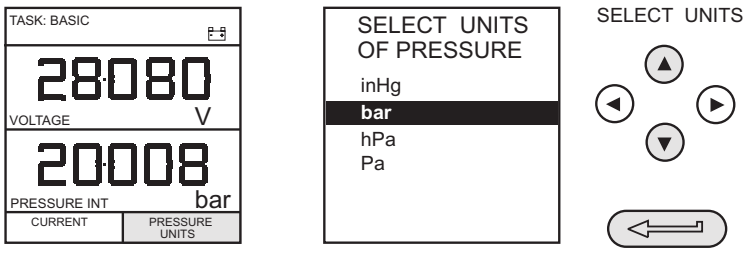
Zinc-carbon and zinc-chloride cells should **NOT** be used in this instrument.

Use only the battery types as shown in the Table on page 7.

Description of Procedures

In the procedures outlined in this User Guide, hard (fixed function) and soft (variable function) key operations are shown in bold type (e.g.) **TASK** and **F1**. These statements mean press the **TASK** key and press the **F1** key. Soft key operations can be allocated to both the F1 and F2 keys. Where a specific soft function is referred to it is written in bold italics (e.g.) ***PROCESS***.

This instrument has a number of operating modes which are described in simplified form in the following sections. Diagrams accompanying the procedures give typical selection sequences and shaded controls indicate that this control key should be pressed in the appropriate sequence. Diagrams should be read from left to right, top to bottom where appropriate. A shaded display soft box indicates that the function key immediately below that soft box should be pressed (either **F1** for the left hand soft box or **F2** for the right). A typical diagram is shown below (e.g.).



In the above diagram the following key sequence is indicated.

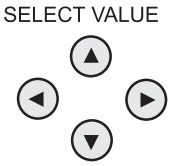
(a) Press the F2 key (the key immediately below the ***UNITS*** soft box).

(b) Use the **Up** and **Down** cursor keys (only) to select the required option. (If all keys shaded, use all these keys to select or enter data).

(c) Press the **ENTER** key.

Using This Guide

The following key symbols are used in the procedure diagrams which follow



Shaded cursor keys indicate that a combination of these four keys, Up, Down, Left and Right should be used to (e.g.) enter an alpha numeric value or to select a function.

Indicates the **ENTER** key. Used to confirm an operation or a selection. Shading indicates key operation.

Exit key, used to clear current menu selection and return to next menu level above current level. Used as an escape key from current operation. Shading indicates key operation.

Hardkey (total 7). Legend beside key symbol indicates function. Shading indicates key operation.

Maximum Instrument Ratings

The following table shows the maximum measurement input ratings of the instrument which should not be exceeded.

PRESSURE	120% FULL SCALE
VOLTAGE	30 V d.c.
CURRENT	55 mA d.c.

Note 1: *The display flashes if the input pressure, voltage or current overrange.*

Note 2: *Max applied voltage for external loop supply = 30V dc (see Page 8).*

OPERATOR CONTROLS (Figure 1)

These divide into two groups, the operator/display controls (shown in Figure 1) and the pressure/vacuum generation components (Shown in Figure 2). The operator controls and a typical display, common to all instrument versions, is shown below.

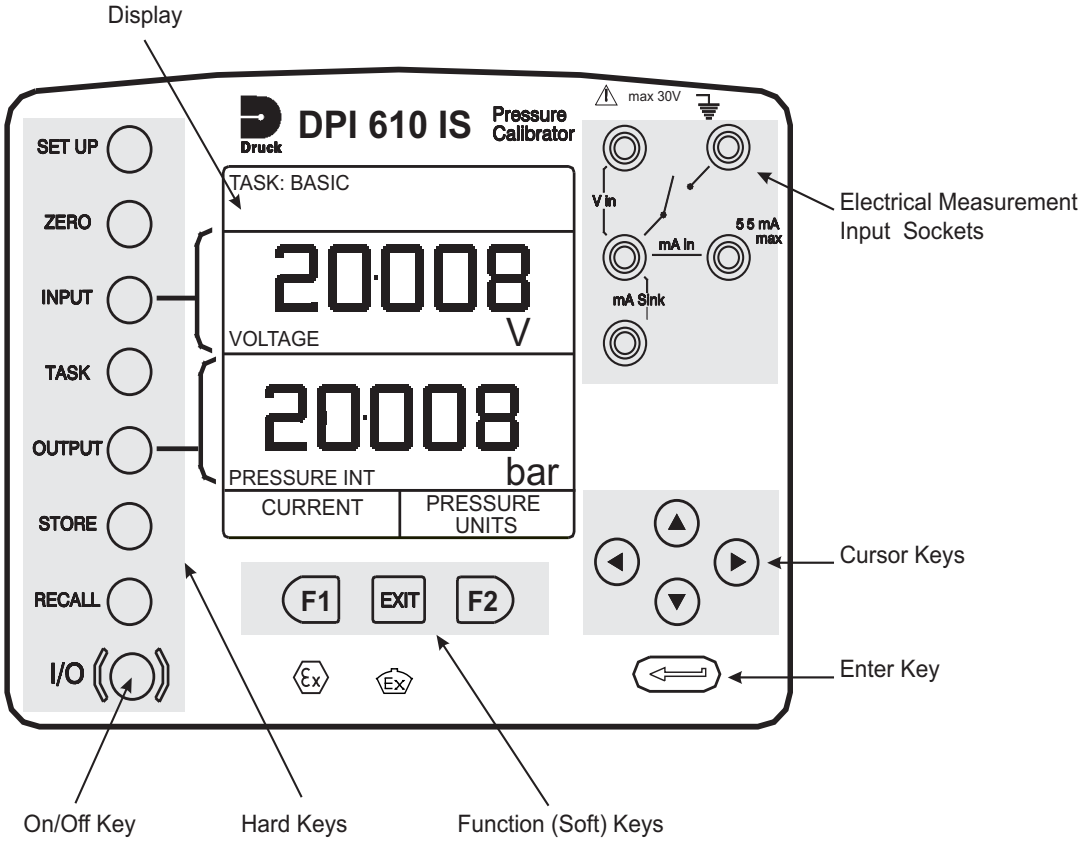
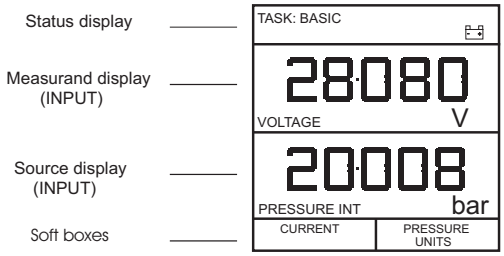


Figure 1 - DPI 610 Keypad

DISPLAY

The display section of the instrument basically divides into four distinct sections. The two main sections of the display are used to display a *Measurand (input parameter)* and a *Source (output parameter).* The remaining sections are used as a status display area and to define soft key functions. A typical display is shown below (e.g.),



HARD KEY FUNCTIONS (Fig. 1)

Key	Function	Ref Page
I/O	This key is used to turn the instrument ON and OFF.	7
SETUP*	The **SETUP** key provides access to the instrument s general configuration parameters which are set up to certain default parameters on delivery.	31
ZERO	The **ZERO** key can be used to zero either the selected measurand or source display, if the display reading is within 5% of zero. Attempts to zero a larger offset result in an error message, ***Zero too large,***	9
INPUT*	The **INPUT** key is used to select which measurand is displayed.	18
TASK	The **TASK** key is used as a means of rapidly configuring the instrument for a number of different types of external device calibration. There are twenty task configurations available, eleven of which are pre-programmed and nine are user definable.	10-17
OUTPUT*	The **OUTPUT** key is used to select which of the instrument s source outputs is displayed.	23-26
STORE*	Depending upon how the instrument s **STORE** mode is setup, this key is used either to store up to 20 display screens (in **SNAPSHOT** mode), or to manually log a screen in **DATALOG** mode.	28, 32
RECALL*	This key is used to recall a previously stored screen to the display. Depending on the **STORE** mode set-up, operation of this key recalls eother the snapshot of a previously stored screen or datalog file. In **STORE** mode, selection displays the last screen stored. By using the cursor keys, the operator can scroll either forward or back through memory locations.	28, 32
ENTER ⇦	The **ENTER** key is used either to enter data (accept entered data), or, in conjunction with the soft keys, to accept a given selection.	2
EXIT	The **EXIT** key operates in conjunction with all the other hard and soft keys to exit from the current screen or menu level, to the level immediately preceding it. To quit completely from any menu level, press **EXIT** until the **MEASURE/SOURCE** screen is displayed.	2

* These key funtions are not available in BASIC mode

SOFT KEYS (Fig.1)

Three soft keys, designated **F1, EXIT** and **F2**, are situated immediately below the display as shown below. These keys have their function allocated by the instrument software which is indicated in the bottom of the display (Voltage for **F1** and Units for **F2** in this example). They are used to select menu (program) options and are fully described under the appropriate section headings.

CURSOR KEYS (Fig.1)

The cursor keys consist of a block of four keys, arranged as shown in Figure 1. They are designated **Up** (⋏), **Down** (⋎), **Left** (≺) and **Right** (≻). In programs where options need to be selected from a list, (e.g.) the **TASK** selection program, the **Up** and **Down** cursor keys are used to highlight one of the options, from which it can be selected by the **ENTER** key. In **TASK** mode, where more than one page of options are provided, the **Left** (≺) and **Right** (≻) cursor keys will switch between pages.

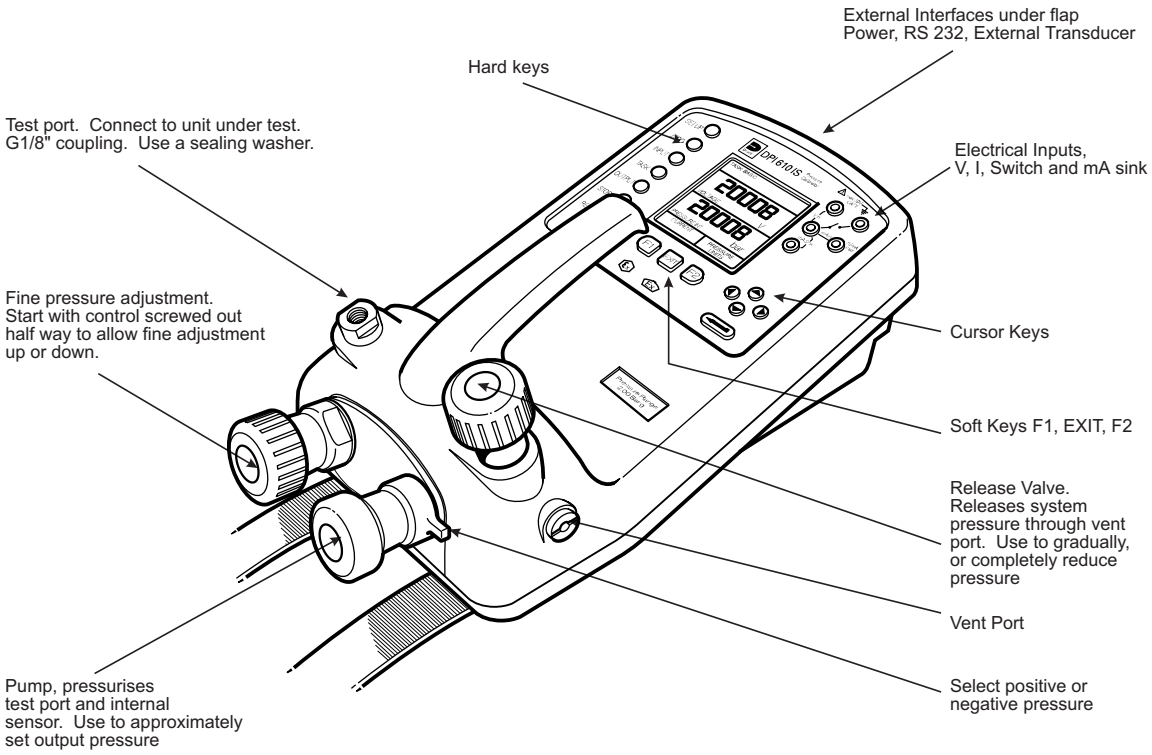


Figure 2 - DPI 610 Calibrator Controls

ELECTRICAL CONNECTIONS

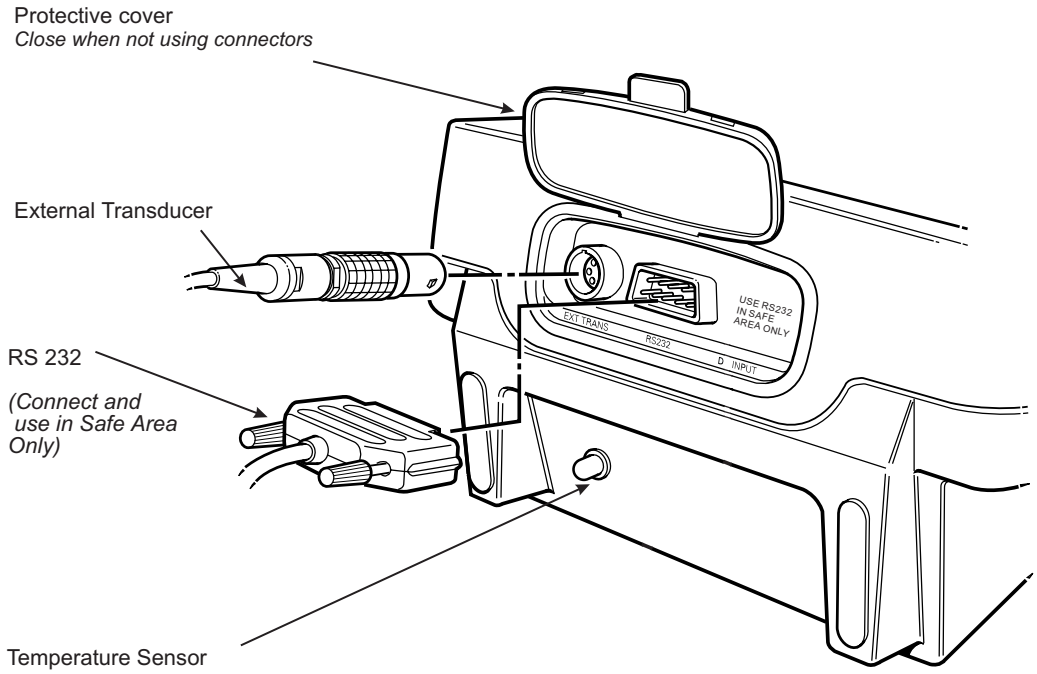


Figure 3 - Electrical System Connections

Measurement inputs and *Source* Outputs are made via the control panel sockets as shown below.

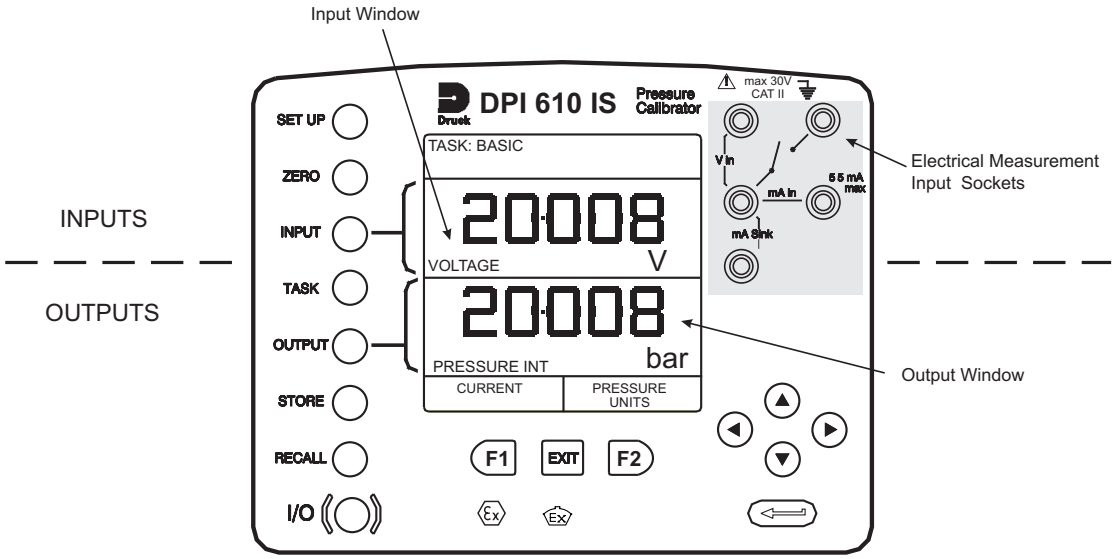
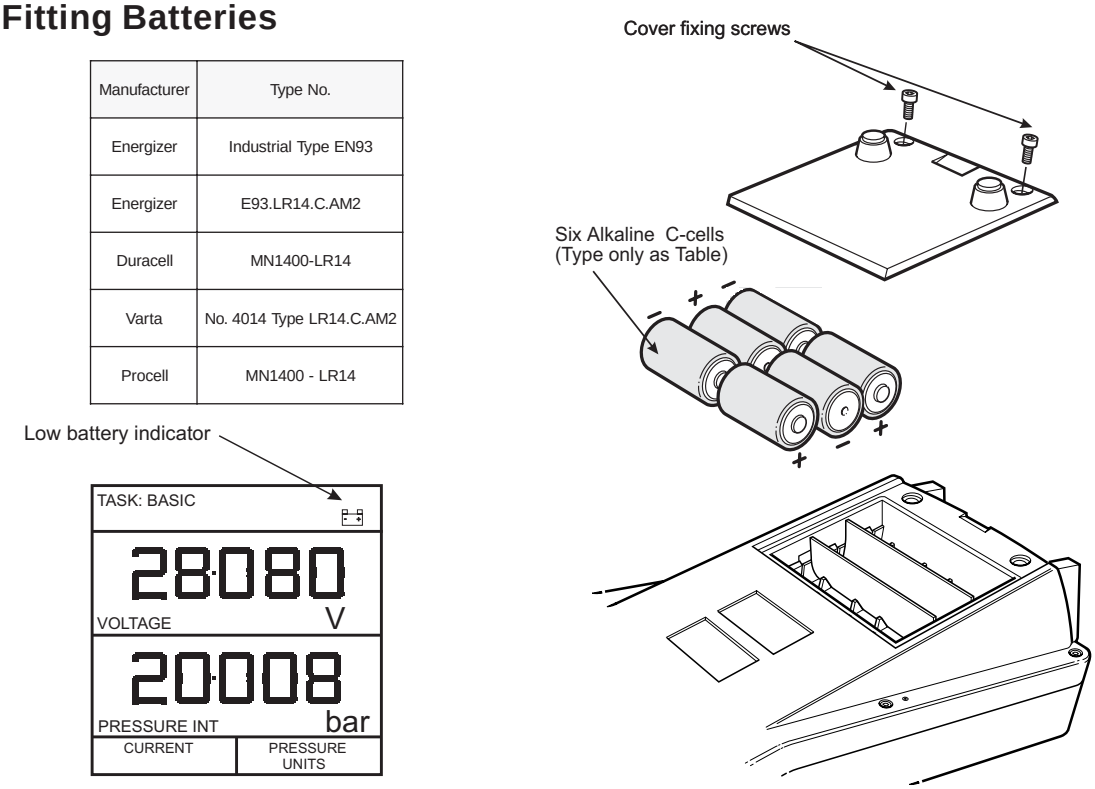


Figure 4 - Electrical Measurement Inputs/Source Outputs

Getting Started

Fitting Batteries

Manufacturer	Type No.
Energizer	Industrial Type EN93
Energizer	E93.LR14.C.AM2
Duracell	MN1400-LR14
Varta	No. 4014 Type LR14.C.AM2
Procell	MN1400 - LR14

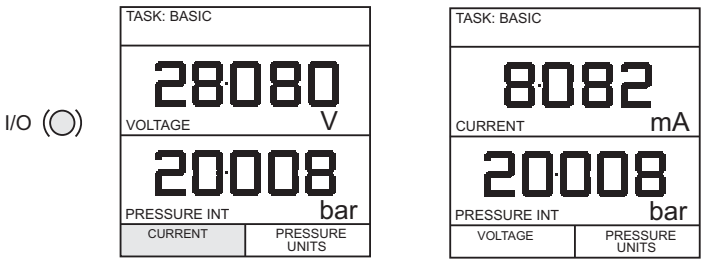


WARNING: BATTERIES MUST ONLY BE FITTED IN A SAFE AREA. USE ONLY THE BATTERIES SPECIFIED IN THE TABLE.

Caution: *Old batteries can leak and cause corrosion. Never leave discharged batteries in the instrument. Old batteries should be treated as hazardous waste and disposed of accordingly.*

Switching On

Press the **I/O** switch on the front panel and proceed as follows.



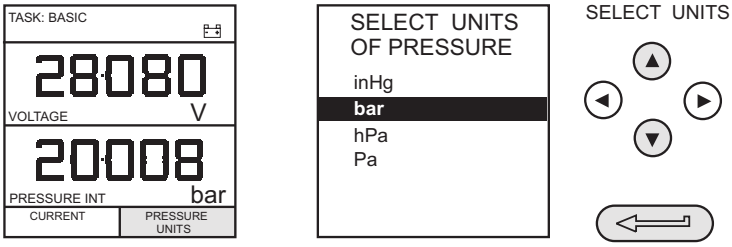
The first time that the instrument is powered up, it will power up in **BASIC** mode with the main screen displaying voltage in the measurand display area and pressure in the source display area. To switch to ***Current*** as measurand, press **F1** as shown. Similarly, **F1** to return to ***Voltage***.

Note: *No other keys are active in this mode and the instrument can only be reconfigured by pressing the **TASK** key and selecting another mode.*

Getting Started

Change Pressure Units

To change the pressure units proceed as follows. If the four units displayed are not the units required, press **TASK** and select any task, other than **BASIC**, press **SETUP** and proceed as detailed on page 31. To return to **BASIC** mode, press **TASK** and select **BASIC**.

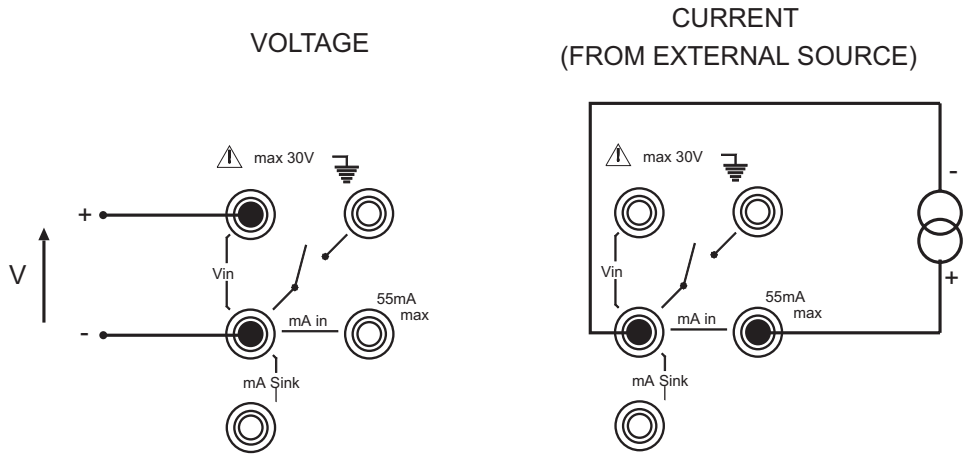


In **BASIC** mode, the unit is configured to carry out basic Pressure to Voltage (**P** to **V)** or Pressure to Current (**P** to **I**) tests a typical test procedures follow.

Voltage and Current Measurements

Connect the electrical input sockets as follows for voltage and current measurements. Use the test leads provided and **DO NOT** push bare wires into the sockets.

Note: *Max applied voltage = 30V dc, Max input current = 55mA dc*

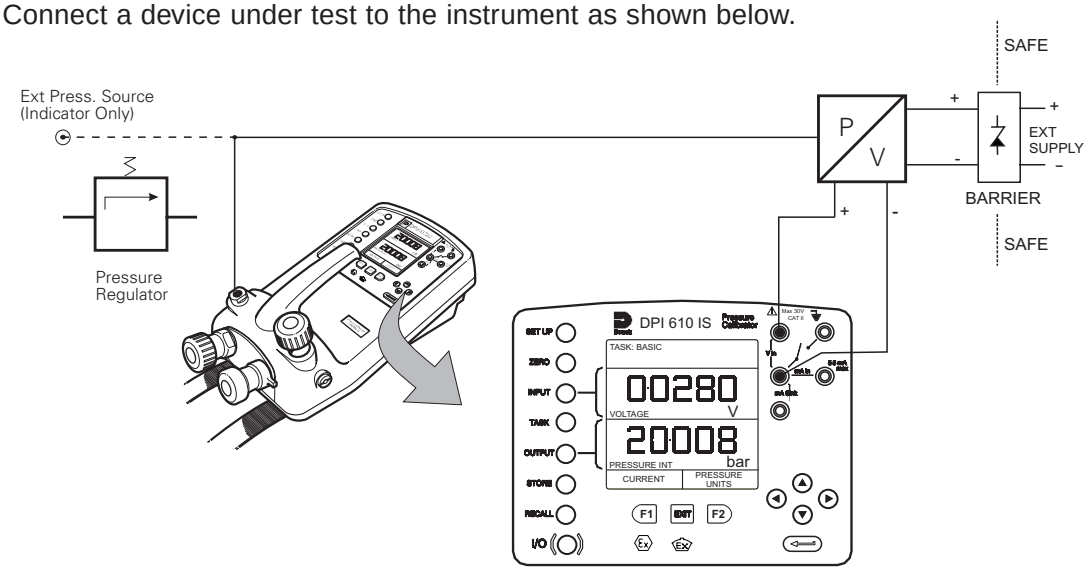


Note: *Max applied voltage for external loop supply = 30V dc*

Getting Started

Typical Calibration Setup (Pressure to Voltage)

Connect a device under test to the instrument as shown below.



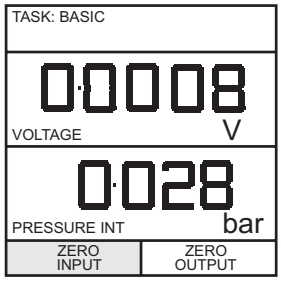
- **General Procedure**

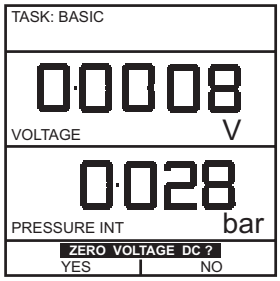
  ❍ Use the handpump to pressurise the system to the required level as indicated on the display. Allow the display to settle and screw the volume adjuster in or out as a fine adjustment to the required pressure. Record the measurand (e.g.) ***Voltage***, reading at each applied pressure.

Zero Display Reading

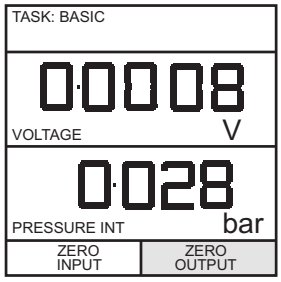
Both the input and output windows can be set to zero by operation of the **ZERO** key, providing that the displayed reading is already within 5% of zero. To zero either the ***INPUT*** (Measurand) or ***OUTPUT*** (Source) windows, proceed as follows (e.g.),

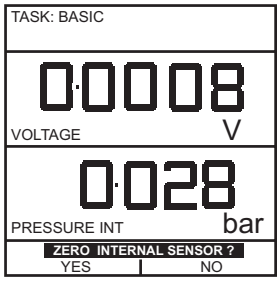
ZERO ◯





ZERO ◯





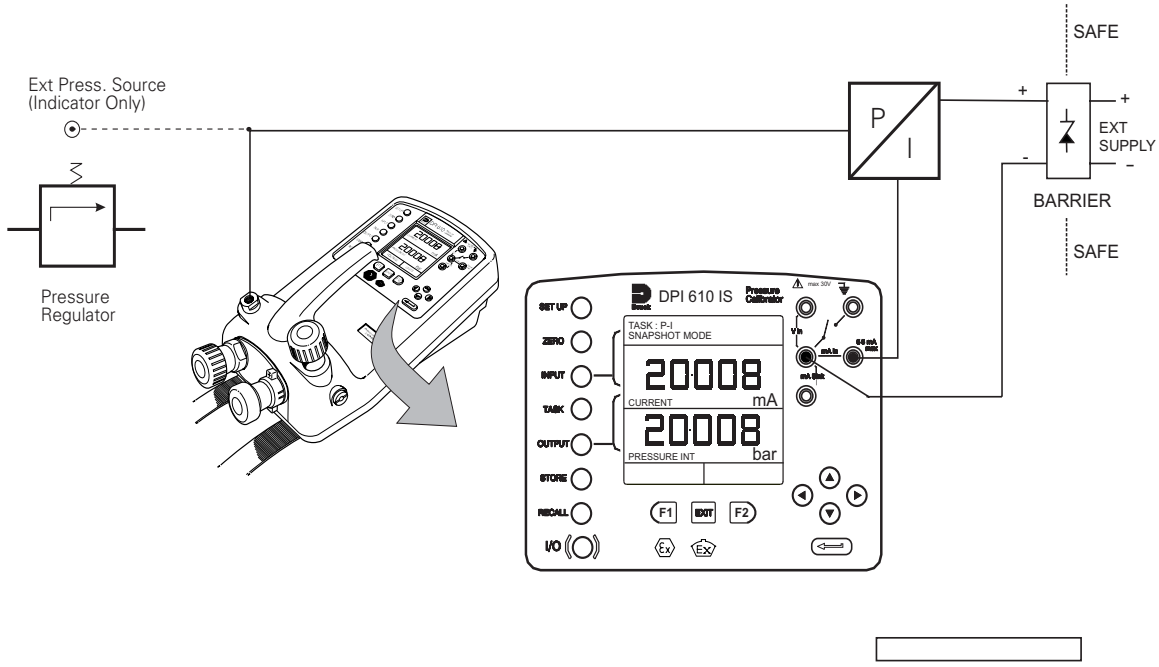
Making Measurements

Basic Mode (Task BASIC)

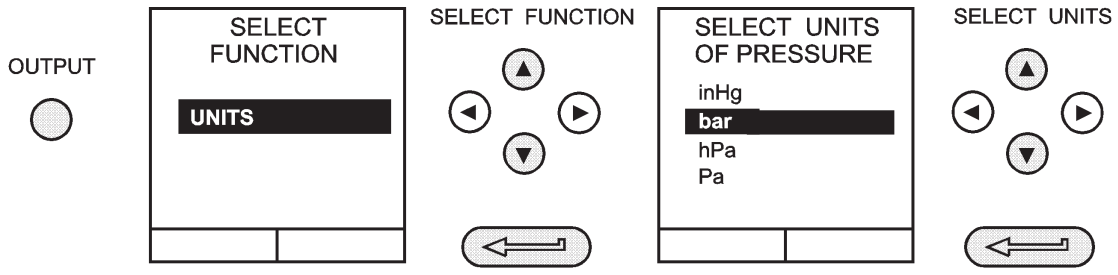
This instrument will power up in this mode the first time that it is used. To select **BASIC** from any other task, press the **TASK** key and select **BASIC** and press the **ENTER** key. **BASIC** mode is fully described in the **Getting Started,** section (see page 9).

Pressure Transmitter (P-I) Task

The transmitter is energised from an external supply via a barrier as shown below.



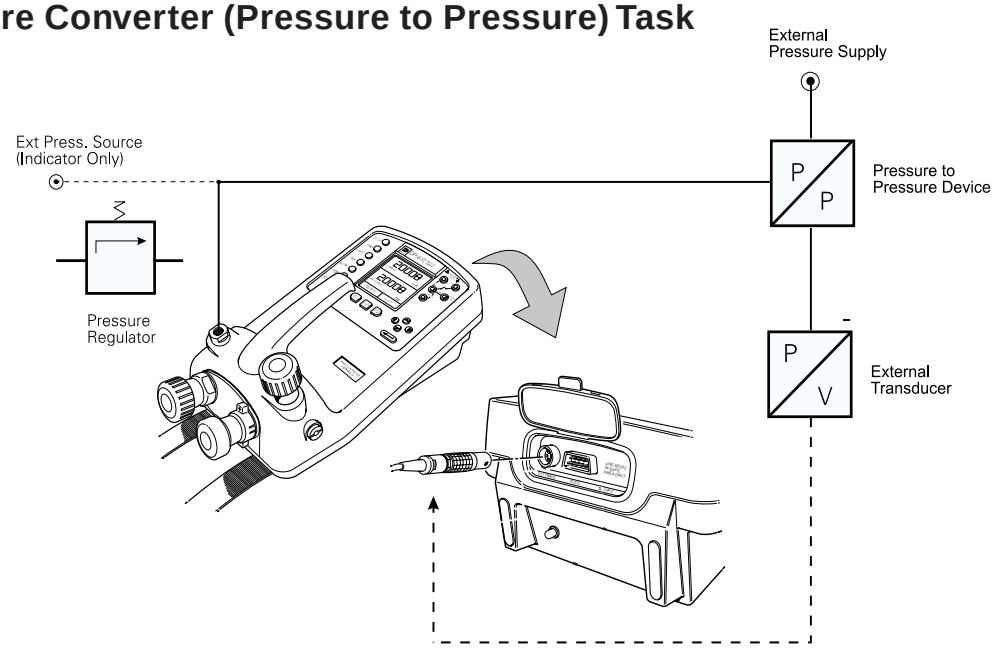
Set Units



Note: If the four units displayed are not the units required, press **SETUP**, select **SETTINGS** and refer to Page 31.

Making Measurements

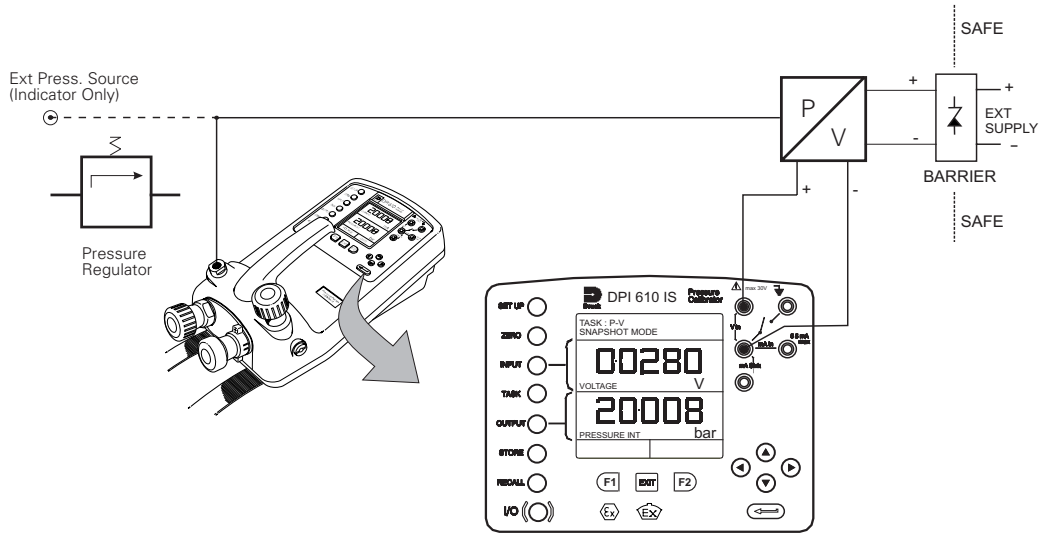
Pressure Converter (Pressure to Pressure) Task



❍ Testing a converter requires one pressure to be applied to the unit under test (UUT) and another (converter output) to be measured. The additional measurement is provided by the external transducer option. **P-P** task configures the instrument to output pressure and to measure pressure. If necessary, units may be changed with the **INPUT** and **OUTPUT** keys.

Note: *Match pressure ranges to give required accuracy and avoid overpressure. External pressure is displayed in the input window.*

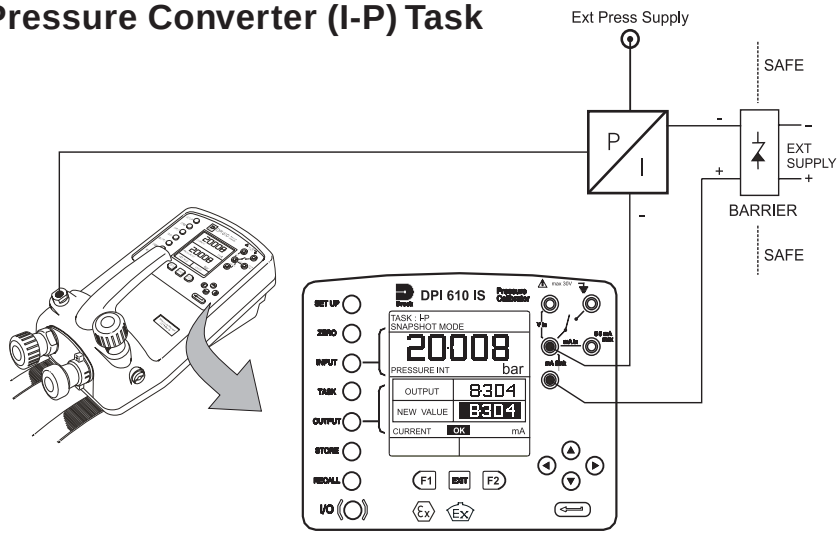
Voltage Output Pressure Transmitter (P-V) Task



❍ If required, change pressure units using the **OUTPUT** key.

Making Measurements

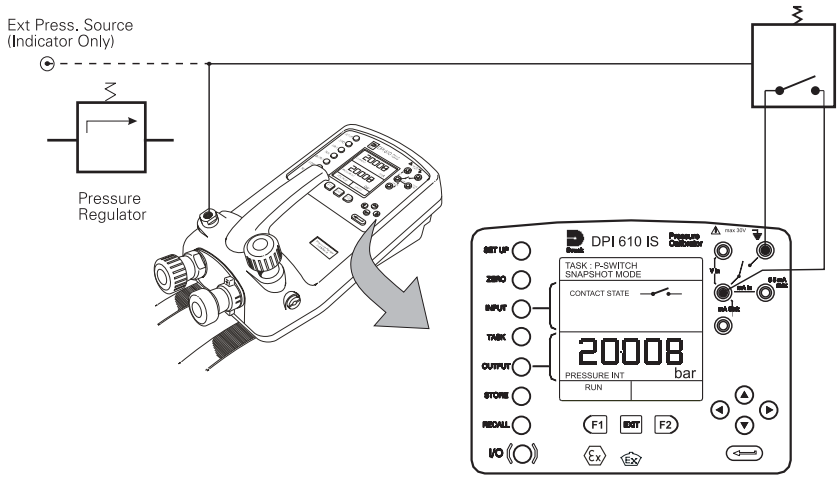
Current to Pressure Converter (I-P) Task



❍ Use the **Up (⍓)** and **Down (⍗)** cursor keys to adjust the loop current to the required value. Alternatively, press **ENTER** and use cursor keys to enter a finite value. Cursor keys can then be used to nudge the output either up or down.

If required, change pressure units with INPUT key. A flashing CHECK LOOP message indicates either an open circuit supply loop (or no external supply).

Pressure Switch Tests (P-SWITCH) Task



❍ Contact state will be shown on display. When contacts close, buzzer sounds.

❍ To run switch test, close vent valve and press the **RUN** (F1) key.

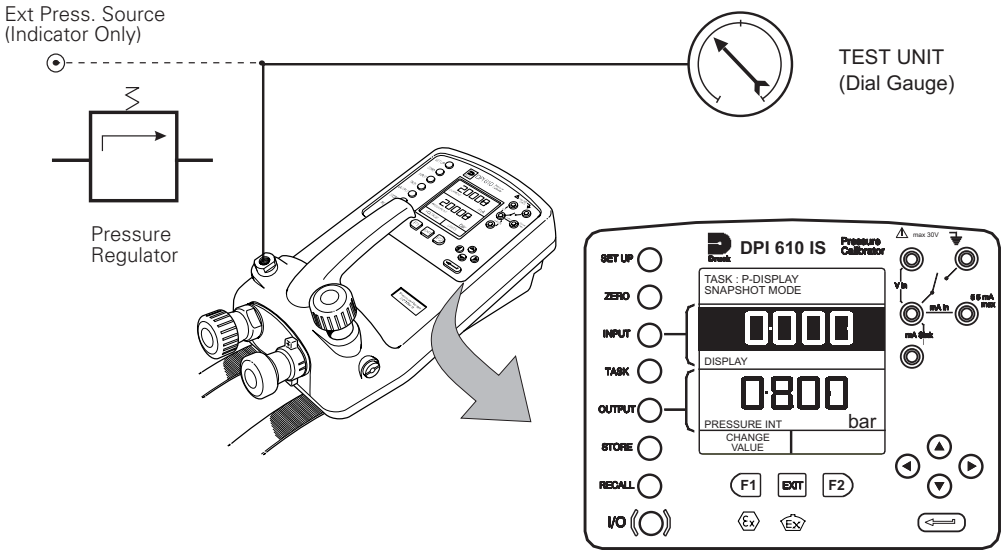
❍ Using the handpump, increase the applied pressure to just below the switch operating point. Screw the volume adjuster in until the switch operates (the operating pressure of the switch is then written to the display).

❍ Reduce pressure until the switch releases (indicated by the switch symbol). The release pressure is then written to the display and the hysteresis displayed.

Making Measurements

Pressure to Display (P-DISPLAY) Task

P-Display is a special application of Datalog. To use this mode, select Datalog from the Store Mode menu as detailed on Page 30. Connect the device under test to the instrument as shown below.

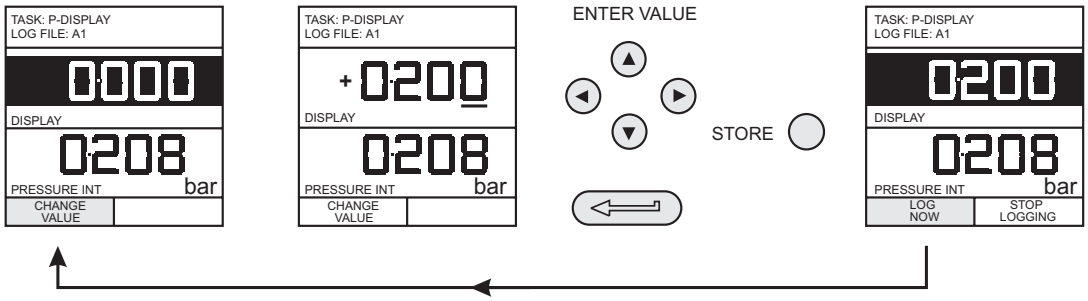


❍ Press **TASK** and select ***P-DISPLAY***. *If required, use* **OUTPUT** *key to change pressure units.*

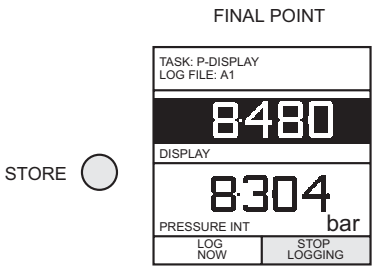
❍ Setup a datalog file as detailed on Page 28.

Note: ***TRIGGER*** *field, automatically set to* ***KEYPRESS****, cannot be changed.*

❍ Apply a series of test pressures to the device under test. Enter displayed reading at each pressure and log each point (e.g.),

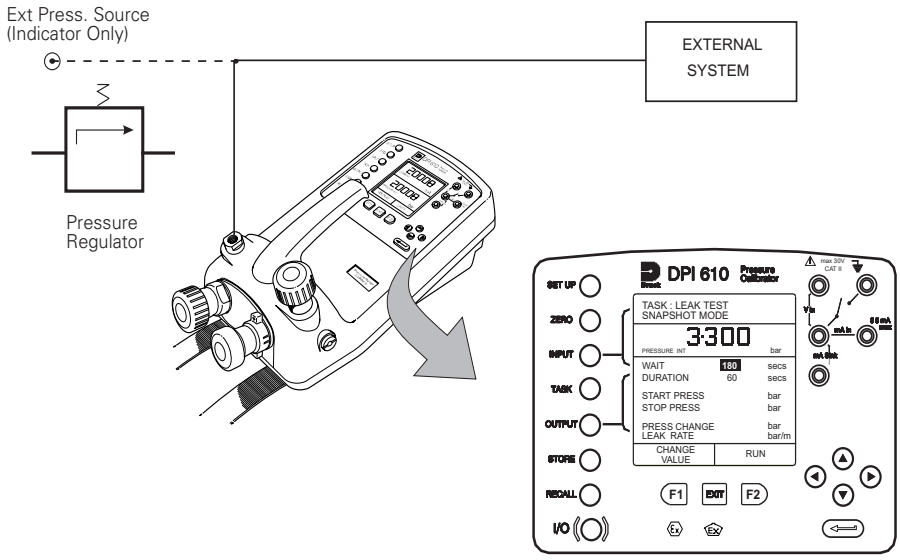


❍ After logging final test point, terminate as follows (e.g.),

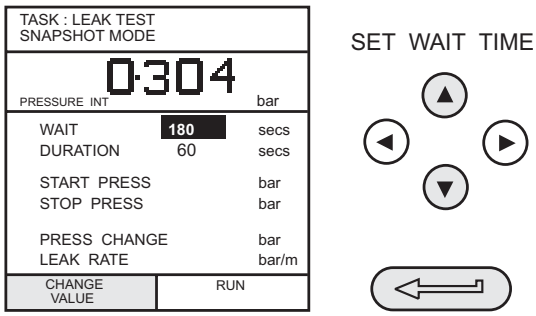


Making Measurements

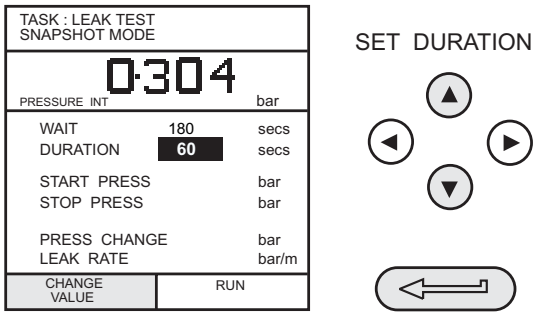
Leak Test (LEAK TEST) Task



- If required, use the **OUTPUT** key to change pressure units.
- Setup the leak test WAIT and DURATION times to the required values as shown below. A minimum wait period of 3 minutes is recommended.



SET WAIT TIME



SET DURATION

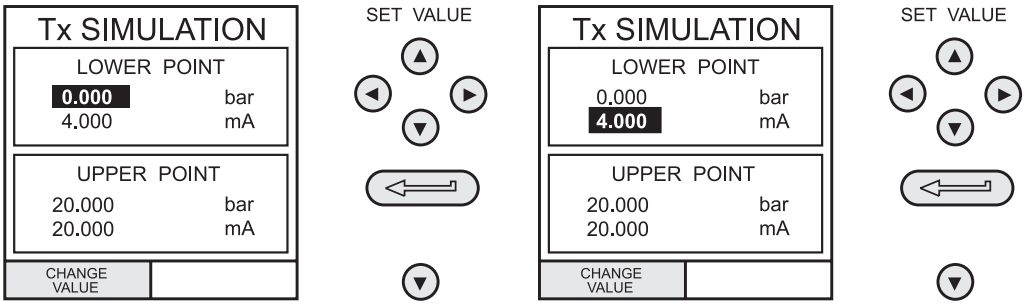
- Close the vent valve and pressurise the external system to the required ***LEAK TEST*** pressure.

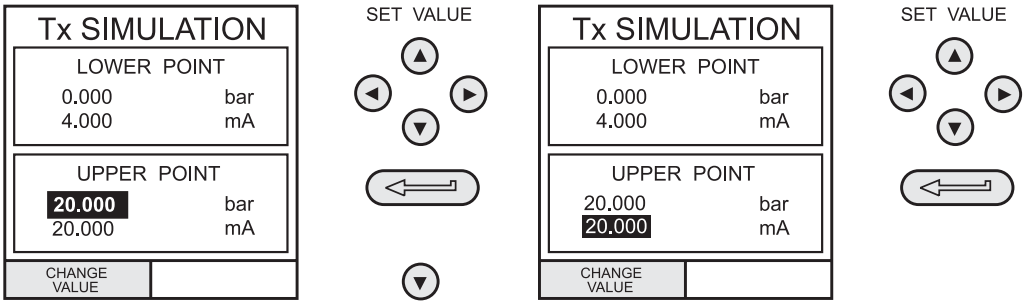
- Press the **RUN (F2)** key to start the leak test. When completed, the bleeper sounds and the leak test results are written to the display.

Making Measurements

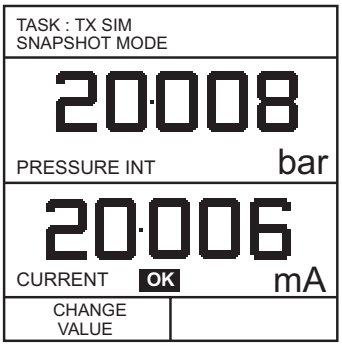
Transmitter Simulator (TX SIM) Task

When used with an external voltage source (see Page 22), provides a current output proportional to the calibrator's measured output pressure (indicated pressure on indicator only version). Select task **TX SIM.** Press **EXIT** to skip setup screen if parameters are correct.





On completion of **Tx SIM** setup, the display is configured as follows (e.g.).



Connect an external power source to the output loop as detailed on Page 22.

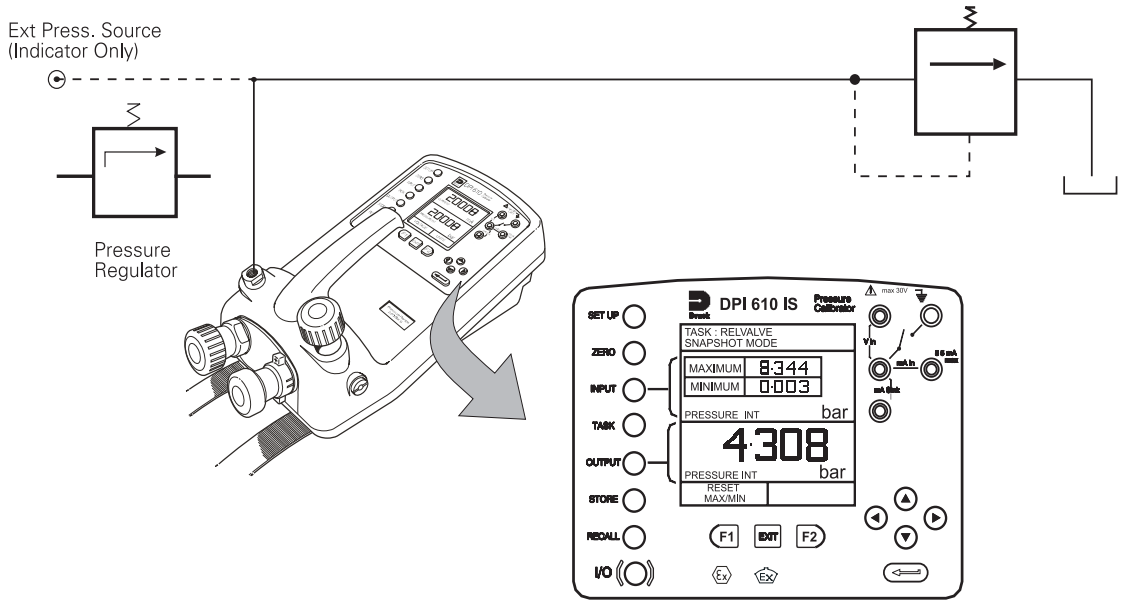
To subsequently change any of the **Tx SIM** scaling parameters, press **CHANGE VALUE** key (F1) to obtain the TX Simulation setup display.

To change the pressure units, press **INPUT** and select the required scale units. If the required scale units are not listed, press **SETUP**, select **SETTINGS** and proceed as detailed on Page 31.

Making Measurements

Relief Valve Test (REL VALVE) Task

To carry out a relief valve test, press **TASK** and select **REL VALVE**. Connect the output pressure port of the instrument to an external system as shown below.



- To change the pressure units, if required, press **INPUT** and select the required units by means of the cursor keys.

- Close the vent valve and, using the handpump or external pressure supply, apply pressure to the relief valve under test.

- When the relief valve operates, the maximum recorded pressure indicates the operating point of the valve.

- Record the test results.

  Note: *The **STORE** key can be used for this purpose. Use right cursor key initially , followed by up/down keys to enter Snapshot text).*

- Open vent valve to release test pressure.

  Note: *If using external pressure supply, isolate supply before opening the vent valve.*

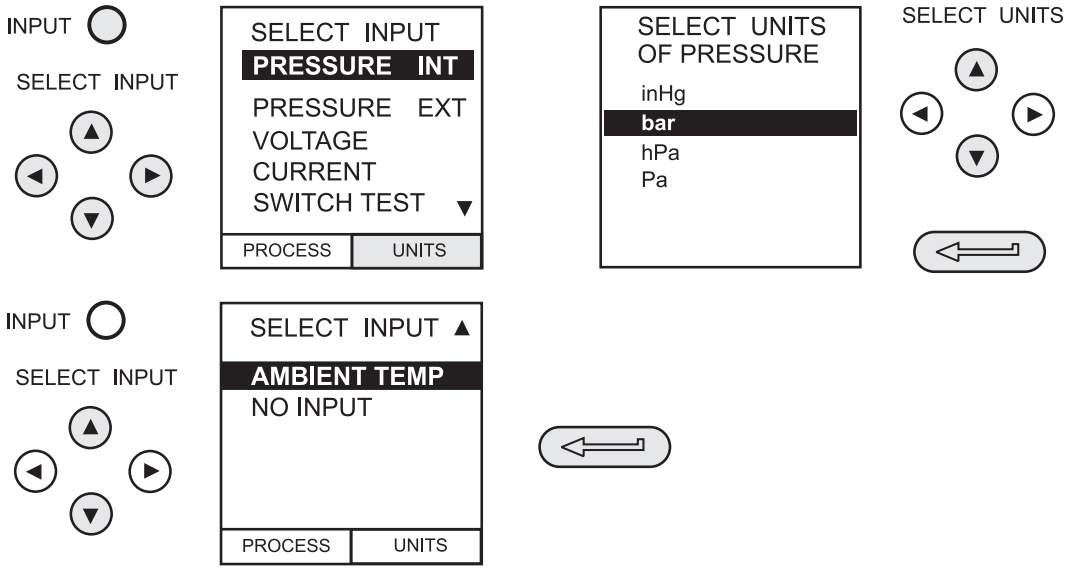
General

Advanced task allows the user to configure the instrument to monitor one of a number of different input measurands (Inputs) and outputs (Sources). Additionally, five process functions, ***Tare, Max/Min, Filter, Flow*** and ***% Span*** can be applied to the input functions.

Select Input

To select an input channel for display, select **ADVANCED** Task from the task menu and proceed as follows. If, in addition to process functions, a range of units is available for the selected channel, a **UNITS** soft box (actioned by the F2 function key), will be written to the display.

The following procedure shows the method of input channel selection and the method of changing units (e.g.),

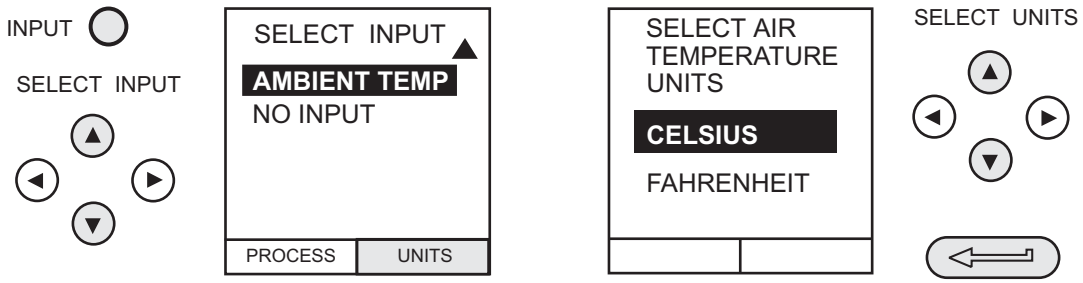


Note: *Left/right arrow keys function as page up/down keys.*

Refer to pages 18 to 21 for details of process functions.

Ambient Temperature Measurement

To set up the instrument to read ambient temperature, proceed as follows (e.g.),



Note: *Ensure that the temperature reading has stabilised.*

Process Functions

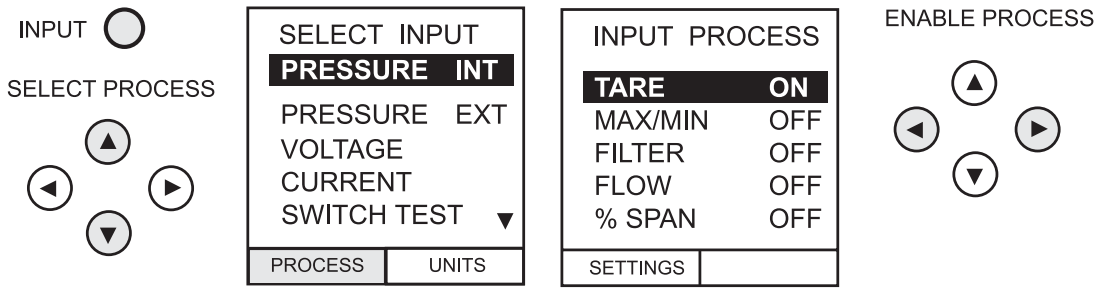
If required, the following process functions are available on the Measurand *(INPUT)* display but **only** in **ADVANCED** task. If the instrument is in any other mode i.e. BASIC or any other task mode, the input and output displays must first be configured in **ADVANCED** task.

Note: *PROCESS functions are not available to the output (SOURCE) channel.*

A summary of the process functions follows.

- **Tare** — Allows either the current display value or a manually entered value to be tared off display parameter reading.
- **Max/Min** — Displays running Max/Min and Present display values simultaneously. Resettable via F1 key.
- **Filter** — Applies low pass filter function to displayed parameter. Filter characteristics *(Settling time and Band)* are user programmable.
- **Flow** — Applies square root function to displayed parameter.
- **% Span** — Converts displayed parameter reading to a percentage of span. Span definable via the F1 key.

Following selection of **ADVANCED** from the task menu, press the **INPUT** key. Use the **Up (▲)** or **Down (▼)** cursor keys to select the required input. Press the **PROCESS** (F1) key and use the **Left (◀)** or **Right (▶)** cursor keys to enable the process on/off (e.g.),



Press **ENTER** to switch the process ON with existing settings or F1 to change process settings (where applicable).

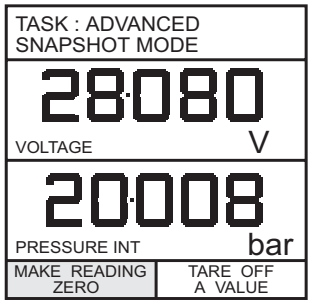
❍ Tare Process Function

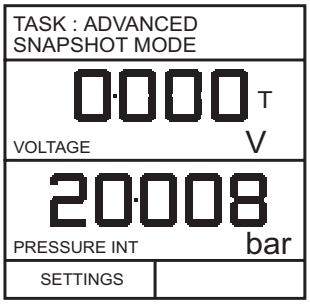
To set up a Tare function, enable **TARE** from the process menu and press F1 to enter the Tare **SETTINGS** functions.

Disable **TARE** by entering process menu and turning the function **OFF.**

Note: *Last TARE setting is retained and will be applied when function is next enabled.*

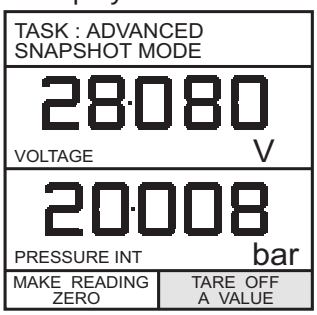
Tare Current Measurand Reading To tare off the current display reading, proceed as follows (e.g.),

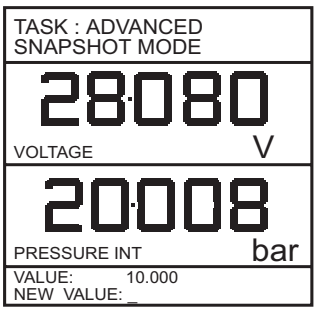


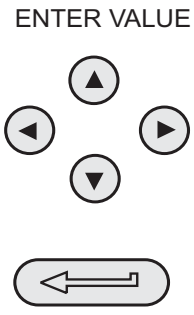


Tare Off An Entered Value To tare off an entered value current, proceed as follows (e.g.),

Note: Display shows the last entered Tare Value

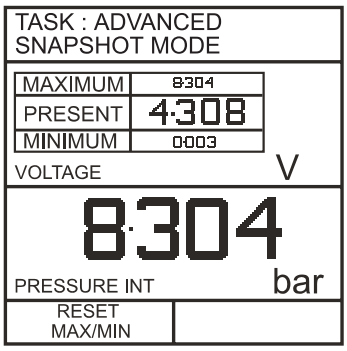






❍ Min/Max Process Function

To set up an input display to show min/max and present measurand reading, enable MIN/MAX from the process menu and press F1 (SETTINGS) to provide **RESET** function. The display is now reconfigured to show the max/min values as follows (e.g.),



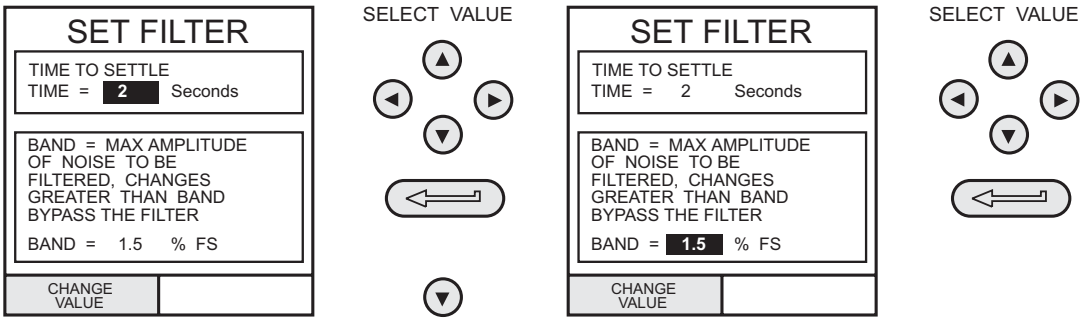
Reset Max/Min display at any time by pressing the F1 key.

To quit max/min, press **INPUT**, select **MAX/MIN** from process menu and switch the function off.

❍ Filter Process Function

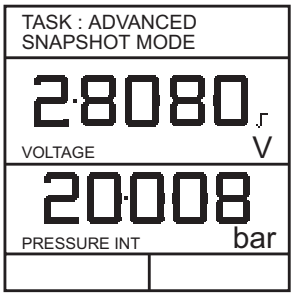
To apply the low pass filter to a selected measurand, enable **FILTER** from the process menu and press F1 (SETTINGS) to provide access to the filter parameters. Two settings are required, *Time to Settle* and *Band*.
To examine the current filter settings and exit without change, press the **EXIT** key.

To setup procedure is as follows.



❍ Flow Function

To apply the flow function to a selected measurand, enable **FLOW** from the process menu and press **ENTER**. The square root symbol is displayed beside the measurand to indicate that the **FLOW** function is active (e.g.)



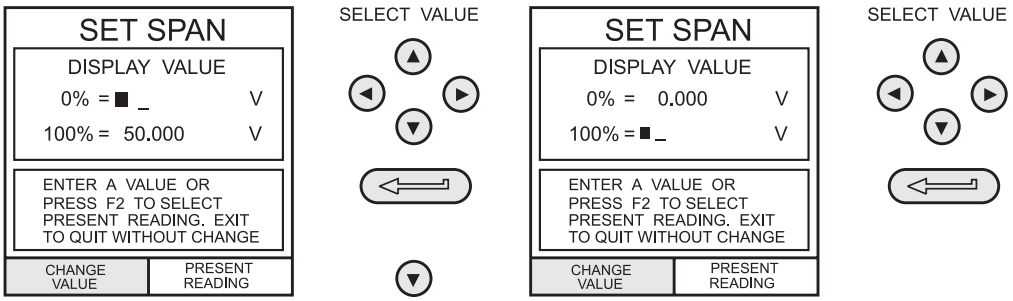
To cancel **FLOW**, press **INPUT** and turn function OFF at the process menu.

❍ % Span

To convert a selected measurand display from a numerical value to a percentage of full scale reading, enable **SPAN** from the process menu and press F1 (SETTINGS) to provide access to the span definition parameters. Two span definitions are required, ***Zero*** and ***Full Scale***.

To leave span at current setting, press **EXIT**.

To define zero and full scale settings, proceed as follows.

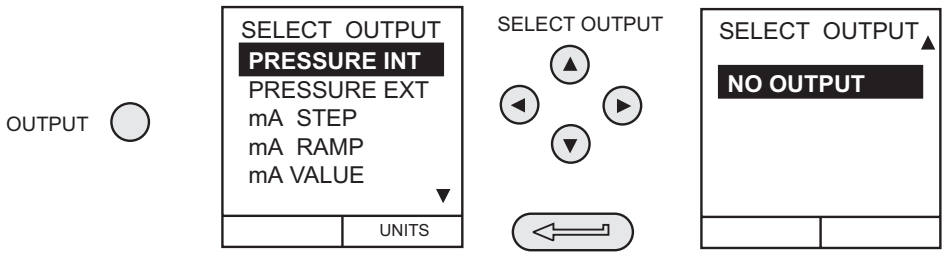


To cancel **% SPAN**, press **INPUT** and turn function OFF at the process menu.

Select Output

To select an output channel for display, select **ADVANCED** mode from the Task menu and proceed as follows. If a channel has a range of units available, a **UNITS** soft box (actioned by the F2 function key), will be also be written to the display.

The following procedure shows the method of output channel selection. Note that there are two pages of options. The second page can be obtained directly from the first by pressing the **RIGHT** cursor key



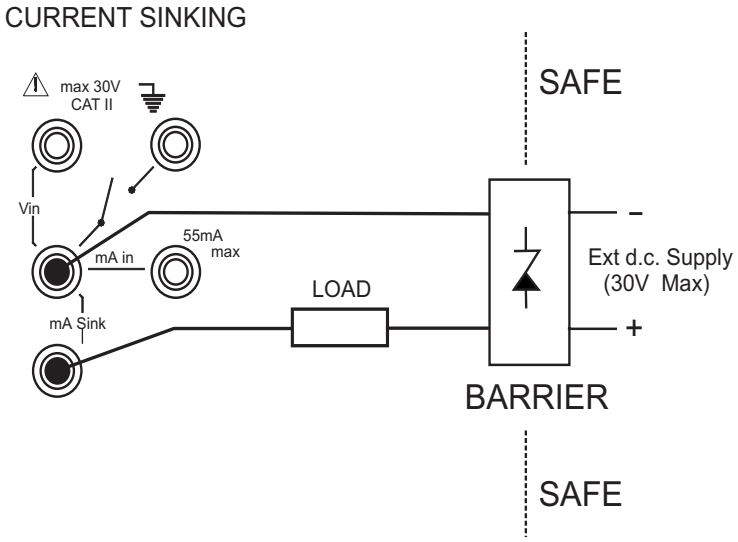
Note: *Left/right arrow keys function as page up/down keys.*

To change the output units (*Pressure* channels only), select the channel with the cursor keys and press F2 before pressing **ENTER**.

Electrical Outputs (Loop Power)

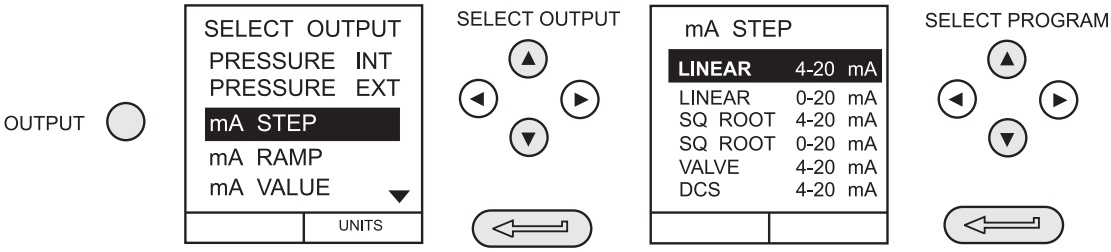
All the electrical outputs, the output loop must be powered from an external supply (current sinking).

External connections to the front panel of the instrument are shown below.

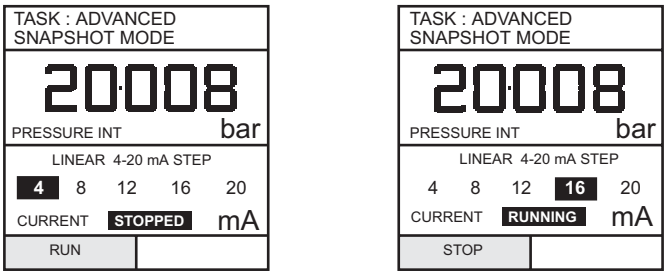


mA Step

To select one of the electrical output programs, press the **OUTPUT** key and proceed as follows (e.g.),



On selection of (e.g.) Linear, the output display window changes to show the selected program of output currents (e.g.),



- ❍ Connect an external power source as shown on Page 22.

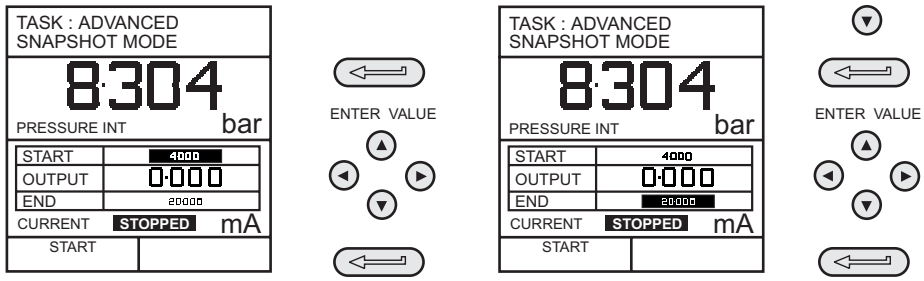
- ❍ Press ***RUN*** (F1) to run program. A flashing status display ***CHECK LOOP*** indicates a fault in the external loop i.e. supply fault or open circuit.
  Note: *The dwell time at each step is approximately 10 seconds.*

- ❍ Press ***STOP*** (F1) when running to stop at any point. Press ***RUN*** (F1) to resume.

mA Ramp

Press the **OUTPUT** key and select **mA Ramp** in a similar manner to that shown above.

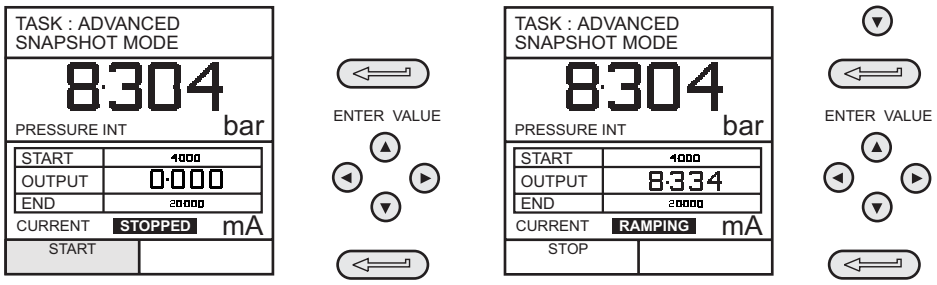
❍ Define ramp required by entering ***START*** and ***END*** current values as shown below (e.g.),



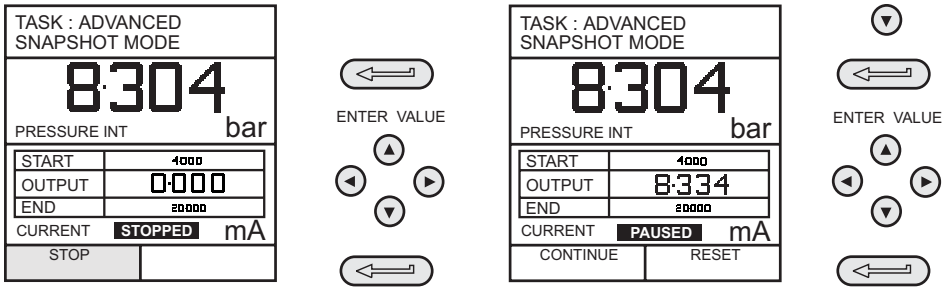
❍ Connect an external power source as shown on Page 22.

❍ Press ***START*** (F1) to run the program. A status display ***CHECK LOOP*** indicates a fault in the external loop i.e. supply fault or open circuit.

Note: *The ramp cycle (min to max or max to min), is approximately 60 seconds.*

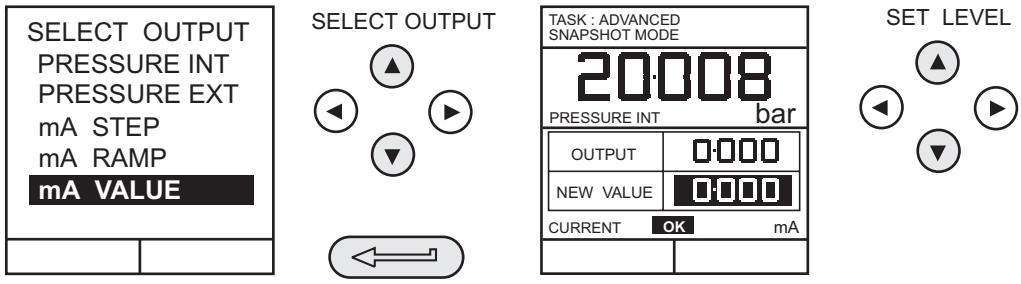


❍ Press ***STOP*** (F1) when running to stop at any point. Press ***CONTINUE*** (F1) to resume from point of pause or ***RESET*** (F2) to return to start point.



mA Value

Press the **OUTPUT** key and select **mA Value** from the Output menu. The procedure is shown below (e.g.),



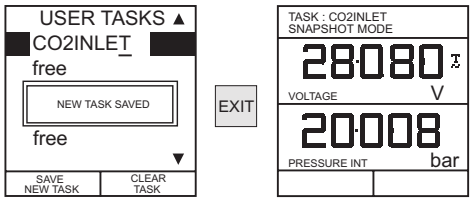
- Connect an external power source as shown on Page 22.

- Use **Up (▲)** and **Down (▼)** cursor keys to adjust output current level. Whilst the loop is made, a status display indicates **OK.** A status display ***CHECK LOOP*** indicates a fault in the external loop i.e. supply fault or open circuit.

Define New Task

To define a new task, proceed as follows.

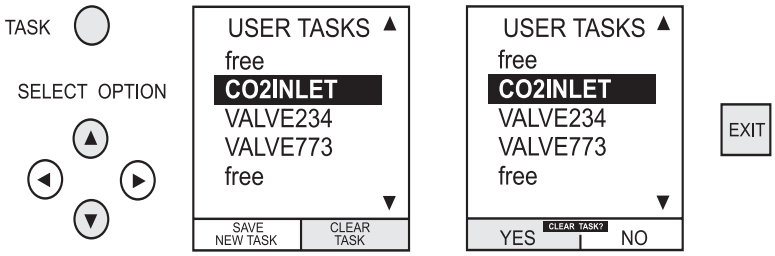
- ❍ Select **ADVANCED** from **TASK** menu.
- ❍ Using the **INPUT** key, select the required measurand as the input display and setup any process functions required.
- ❍ Using the **OUTPUT** key, select the required measurand as the output display.
- ❍ Press **TASK** and select ***Free***. Enter new task name as follows (e.g.),



On completion of the above procedure, the display reverts to newly setup task as shown.

Clear Task

To clear a user defined task, select **TASK** and proceed as follows (e.g.),

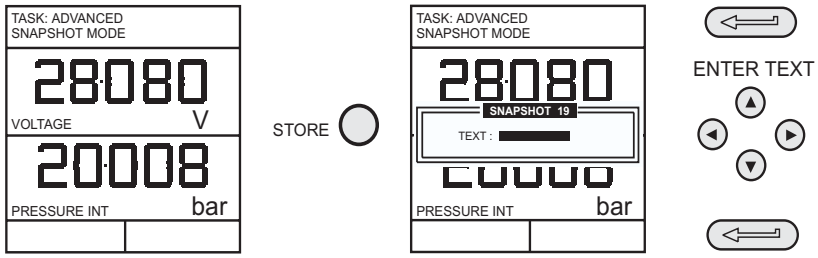


Saving Display (Snapshot) or Datalog

Memory operations depend upon how Store mode has been set-up. Three options are available **None, Snapshot** and **Datalog.** Refer to **SETUP** for details.

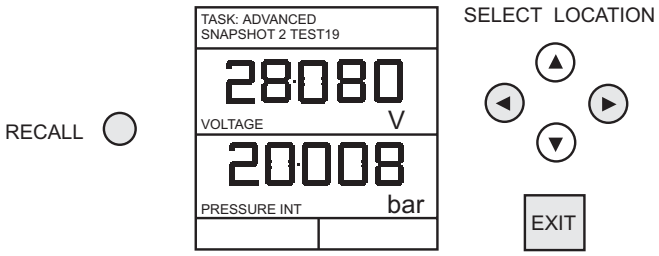
Store Operations

To store any display (menu displays excepted), press the **STORE** key. This saves the current display to the next available location. Supporting text (10 characters) may be appended. Twenty memory locations are available on a cyclic buffer. When all 20 have been used, store operations overwrite existing locations, starting at *Location 1.*



Recalling Stored Data

To recall a previously stored display, press the **RECALL** key. This recalls the last display saved. Press the **Left (◁)** or **Right (▷)** cursor keys to recall the previous or next locations respectively. To exit **RECALL**, press the **EXIT** key



Datalog Operations

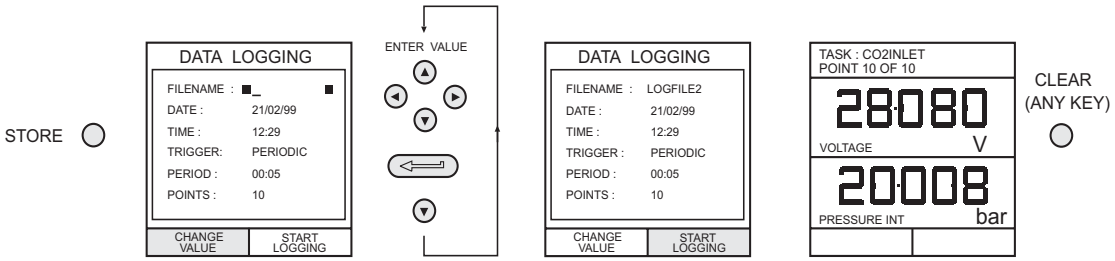
Datalog is a special application of store mode which enables the calibrator to either automatically log displays at preset time intervals or to manually log a display on operation of the **STORE** key. Logged data is written to a user specified file.

To set up a datalog file, proceed as follows.

- ❍ Select a task, other than **BASIC**. If using **ADVANCED**, set up required Source and Output parameters.
- ❍ Use **SETUP** to select Datalog from the Store Mode Menu (See Page 30).

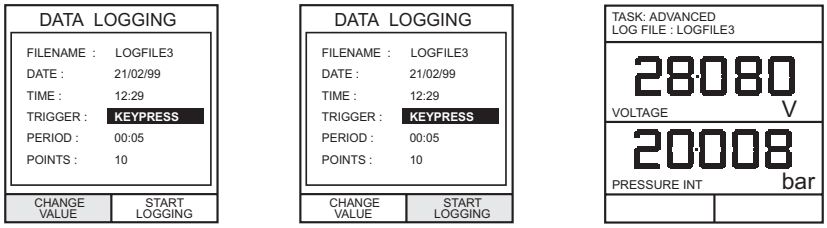
Auto Log (Timer)

Press **STORE** and setup the datalog file parameters as shown below. Use ***CHANGE VALUE*** (F1) followed by cursor keys to set field values. For Auto Log, setup ***TRIGGER*** field to ***PERIODIC***.

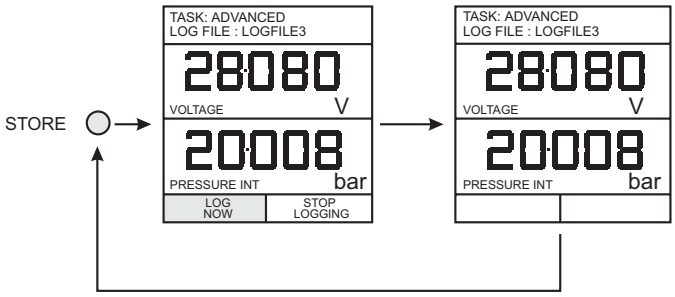


Manual Logging

Enter the file details as shown above and select ***KEYPRESS*** for ***TRIGGER*** field. Screen reverts to displayed parameters showing setup file as shown below (e.g.),

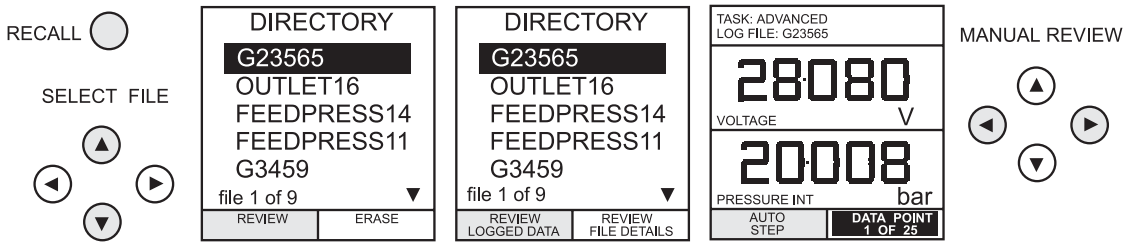


- ❍ Use a combination of **STORE** and **LOG NOW** (F1) to log events as follows.



Recall Datalog Files

To recall a datalog file to the display, ensure that **DATALOG** is selected from the SETUP menu, proceed as follows (e.g.),

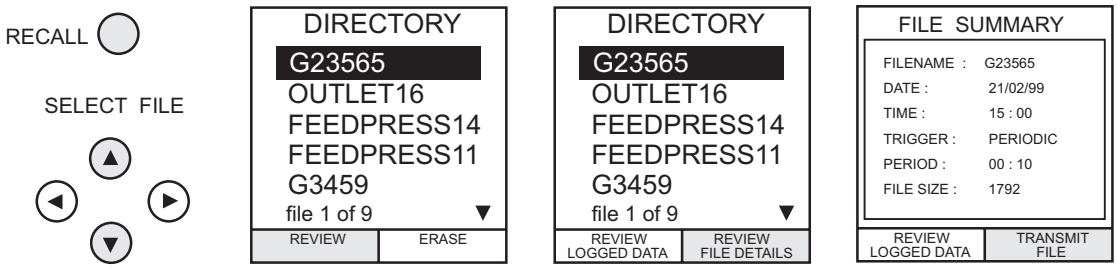


Downloading Datalog Files

WARNING: This procedure must be carried out in a SAFE area.

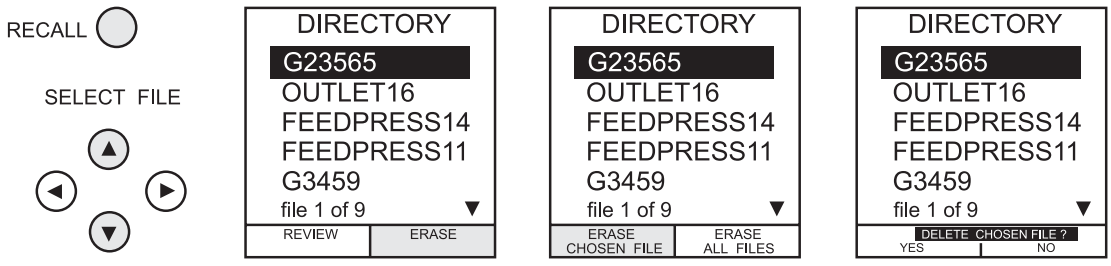
Connect the RS232 socket of the instrument into either the COM1 or COM2 port of the PC. Ensure that the RS232 parameters at the PC end match those of the instrument. The RS232 parameters of the instrument can be checked as detailed on Page 32. Set up a file on the PC to receive the data, (e.g.) in the *Windows Terminal* program.

To download the file, proceed as follows.



Delete Datalog Files

To delete a logged file, proceed as follows. Alternatively, to delete all logged files simultaneously, select ***ERASE ALL FILES*** (F2) at the erase screen.



Using Setup

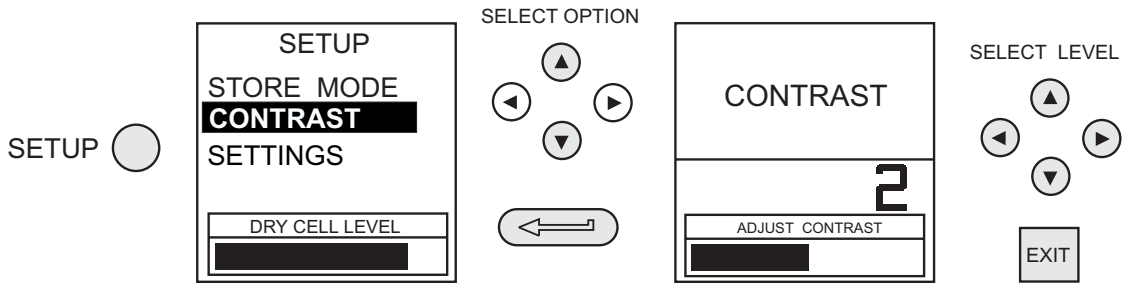
General

SETUP mode is available in all modes except **BASIC.** It permits the setup of the following instrument parameters.

- Store Mode - None, Snapshot, Datalog.
- Contrast.
- Instrument Settings - Units, Language, RS232 parameters, Powerdown, and Calibration Routines *(Refer to page 33 for Calibration details)*.

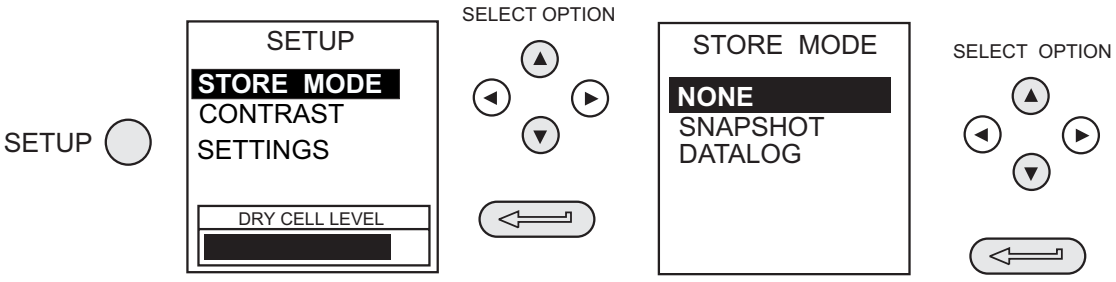
Contrast

Select ***CONTRAST*** from the Setup Menu and proceed as follows.



Store Mode

Select ***STORE MODE*** from the Setup menu and select required mode as follows.



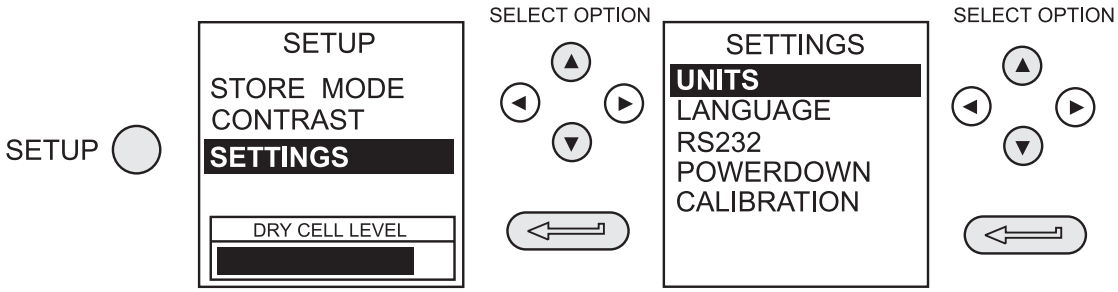
Calibration

Calibration routines are password protected. Refer to Calibration Section, Page 34 for details of use.

Using Setup

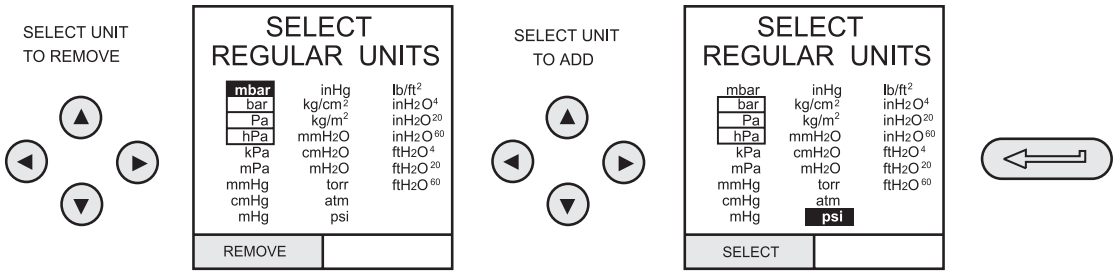
Settings - Select Setup Option

To select one of the Settings options from the Setup menu, proceed as follows.



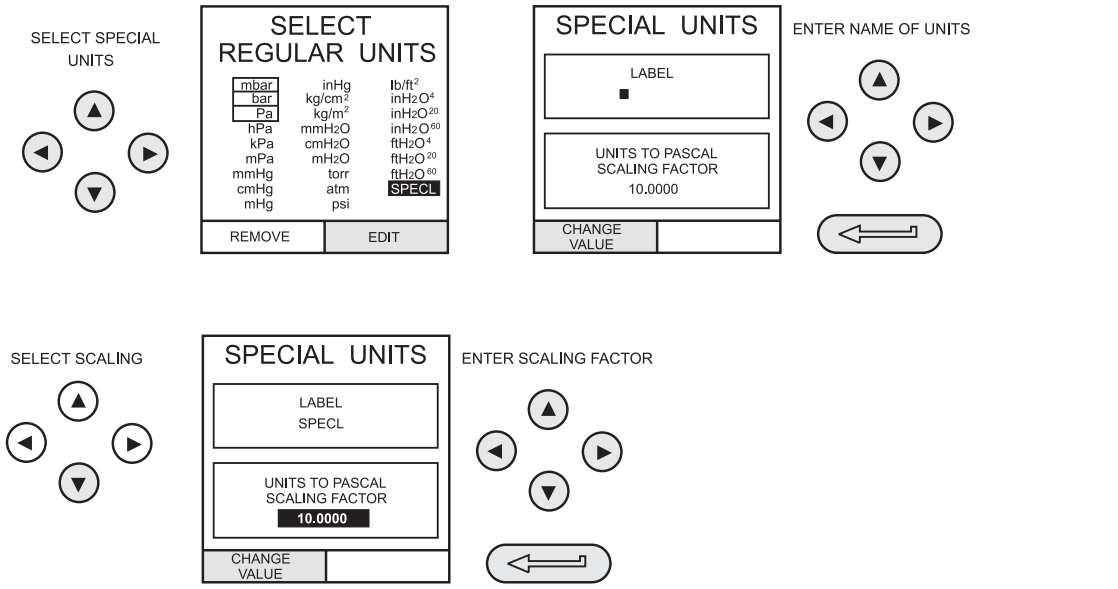
Units

Select (pressure) Units from the Settings menu and proceed as follows.



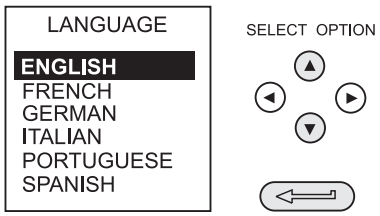
Define Special Units

Select (pressure) Units from the Settings menu, and select Special Units and proceed as follows.



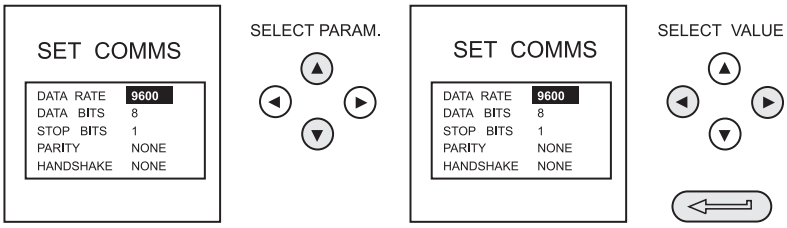
Using Setup

Language



RS232

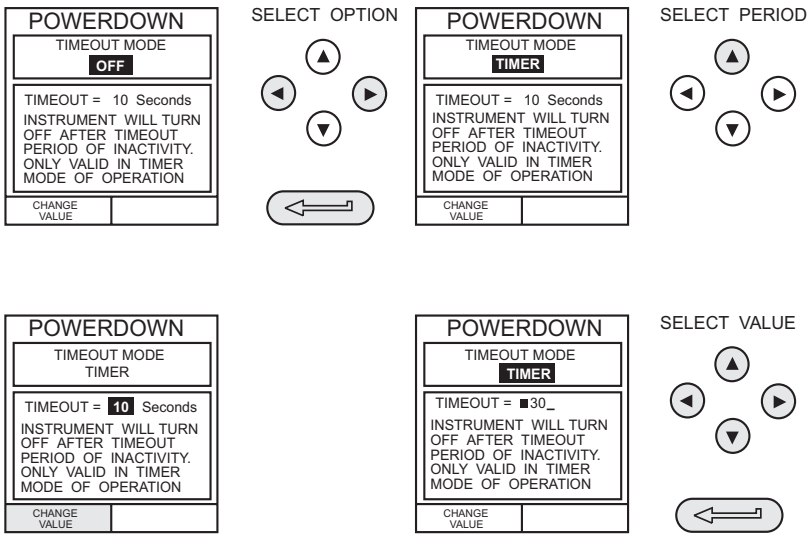
Select ***RS232*** from the Settings Menu and proceed as follows.



Note: *Use of the RS 232 communications interface is only permitted in a SAFE area. The settings shown above are the default settings.*

Powerdown

Select **Powerdown** from the Setup menu. The method of setting up the **Powerdown** (Auto Power Off) function is similar to that detailed for the Backlight (Page 30).



If **TIMER** mode is selected, following a period of inactivity, the instrument will automatically power off after the preset **TIMER** period.

If **OFF** is selected, auto power off is inhibited and once switched on, the instrument will remain **ON** until it is manually switched **OFF**.

Calibration

General

The instrument is supplied by the manufacturer, complete with calibration certificate(s). The re-calibration interval will depend on the total measurement uncertainty which is acceptable for a particular application. In order that the instrument remains within the quoted accuracy, it is suggested that it's calibration be checked at 90 day intervals.

The DPI 610 is a very precise measuring instrument and the test equipment and conditions of test must be suitable for the type of work. The use of a Class A compensated deadweight tester is essential. The tests should be carried out in a controlled environment by a competent, trained person.

If, when the accuracy of the instrument is checked, it is found to fall outside the specification, calibration adjustment can be undertaken to compensate errors.

The manufacturer offers a comprehensive and, if required, NAMAS accredited calibration service.

Calibration Check

At the chosen interval, the instrument readings should be compared with a known standard. Any deviations between the instrument and the standard should be noted, taking due account of the traceability (accuracy to a National Standard). If these deviations exceed the published tolerance, or any other suitable chosen performance standard, then the user may wish to carry out a calibration adjustment.

It is recommended that measurements be checked at 0, 20, 40, 60, 80 and 100% of full scale on an ascending and descending run.

Calibration Adjustment

If the instrument is operating correctly, only zero and full scale calibration will vary. Any excessive non-linearity or temperature effects indicate a fault. The instrument should be returned to a qualified service agent.

Calibration

General Procedures

The following general hints are provided as a guide to calibration procedures. Full calibration procedures are described in Druck publication number K235.

Do

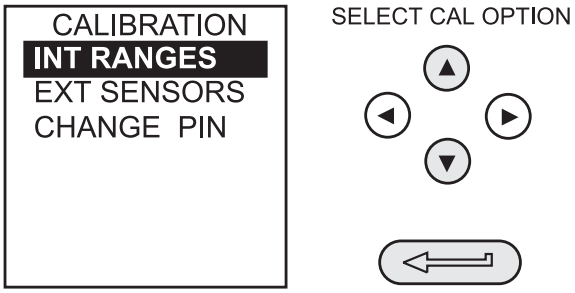
Use high quality ***Repeatable and Linear*** pressure sources and allow adequate stabilisation time before calibration (minimum 1 hour).

Conduct the calibration in a temperature and preferably, humidity controlled environment. Recommended temperature is **21°C, ±2°C**.

Use deadweight testers carefully and away from draughts.

Using the Calibration Menu

The calibration routines are selected from the Setup menu as detailed on page 31. Enter the calibration PIN number, initially set to **4321**, press ← and the Calibration Menu will be displayed as follows. It is recommended that the PIN number be changed as soon as possible.



Select the item to calibrate from the menu as shown above and follow the calibration procedure outlined on the display. The following test equipment will be required.

Pressure Measurement Channels (Internal and External)

- Deadweight Tester.

Voltage Ranges (5V and 30V)

- Voltage source.

Current Inputs and Outputs

- Digital Milliammeter.

Calibration

Temperature

- ❍ Precision Temperature Meter.

On completion of calibration routines, exit the calibration mode by pressing the **EXIT** function key.

Cleaning Instructions

Clean the case of the instrument by using a damp cloth and mild detergent.

Note: ***DO NOT*** *use any solvents for cleaning purposes.*

Service

Approved Service Agents

The following are approved Service Agents for Druck Instruments.

FRANCE

Druck SA, 19 Rue Maurice Pellerin,
92600 Asnières, France.

Tel: (1) 41 32 34 64
Fax: (1) 47 93 00 48

GERMANY

Druck Messtechnik GmbH,
Lessingstrasse 12, 61231 Bad Nauheim,
Germany.

Tel: 6032 35028
Fax: 6032 71123

HOLLAND

Druck Nederland B.V., Postbus 232,
Zuideinde 37, 2991 LJ Barendrecht,
The Netherlands.

Tel: 1806 11555
Fax: 1806 18131

ITALY

Druck Italia Srl., Via Capecelatro 11,
20148 Milano, Italy.

Tel: 2 48707166
Fax: 2 48705568

JAPAN

Druck Japan KK, Medie Corp Building 8,
2-4-14 Kichijyoji-Honcho, Musashino,
Tokyo 180, Japan.

Tel: 422 20 7123
Fax: 422 20 7155

UK

Druck Ltd., Fir Tree Lane, Groby,
Leicester, LE6 OFH.

Tel: 0116 231 7100
Fax: 0116 231 7103

USA

Druck Incorporated, 4 Dunham Drive,
New Fairfield, Connecticut 06812, USA.

Tel: 203 746 0400
Fax: 203 746 2494

Appendix 1

HYDRAULIC CALIBRATOR VERSION

K239 Issue No. 2

Introduction

This version of the DPI 610 provides manual generation of hydraulic pressure and consists of a screw-press with a priming pump and priming isolation valve as shown below. The bleed pipe connections are also shown in Figure A1.

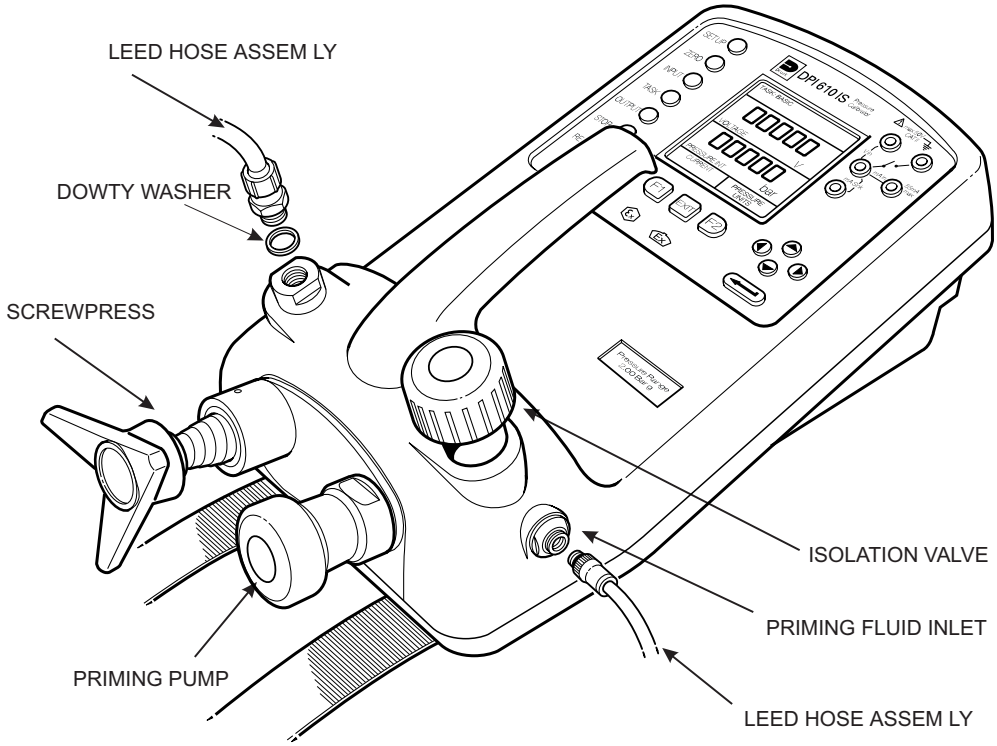


Figure A1 - DPI 610 HC Connections

The internal hydraulic parts are brass, stainless steel, copper, nylon and fluorocarbon rubber (Viton). The hydraulic fluid can be either demineralised water or one of the hydraulic fluids listed in Table A1.

Caution: Only use the fluids recommended. **DO NOT** mix hydraulic fluids.

ISO 3448 Viscosity grade	Approx. SAE Viscosity Classification	Shell	Esso	Mobil
VG10	5W	Tellus R10	Nuto H10	Velocite No.6
VG15		Tellus T15 Tellus V15	Nuto H15	
VG22		Tellus 22 Tellus R22	Nuto H22	DTE 22
VG 32	10W	Tellus V32	Nuto H32	DTE Oil Light DTE 24
VG 37		Tellus 37 Tellus R37 Tellus T37 Tellus V37		

Table A1 - Recommended Hydraulic fluids

Safety Instructions

WARNING

HYDRAULIC FLUID IS INJURIOUS. OBSERVE RELEVANT HEALTH AND SAFETY PRECAUTIONS. USE APPROPRIATE PROTECTIVE BARRIERS AND EYE PROTECTOR.

BEFORE APPLYING PRESSURE, EXAMINE ALL FITTINGS AND EQUIPMENT FOR DAMAGE AND ENSURE THAT ALL EQUIPMENT IS TO THE CORRECT PRESSURE RATING.

DO NOT EXCEED THE MAXIMUM WORKING PRESSURE OF THE INSTRUMENT (INDICATED ON START-UP SCREEN AT SWITCH-ON).

Caution: Observe absolute cleanliness when using the instrument. Severe damage can be caused if equipment connected to this instrument is contaminated. Connect only clean equipment to the instrument. To avoid any contamination, an external filter is recommended.

Preparation for Use

- Fit the bleed pipe connection to the priming port using a bonded seal as shown in Figure A1.
- Ensure that the screwpress is wound fully in (clockwise).
- Ensure that the isolation valve is open (fully anticlockwise).
- Connect the device or system under test to the pressure port using a bonded seal as shown in Figure A2.

WARNING

ENSURE THAT THE CONNECTING LINE TO THE EXTERNAL DEVICE OR SYSTEM IS CAPABLE OF WITHSTANDING THE LINE PRESSURE TO BE APPLIED.

Note: *A bleed point must be provided on the external device.*

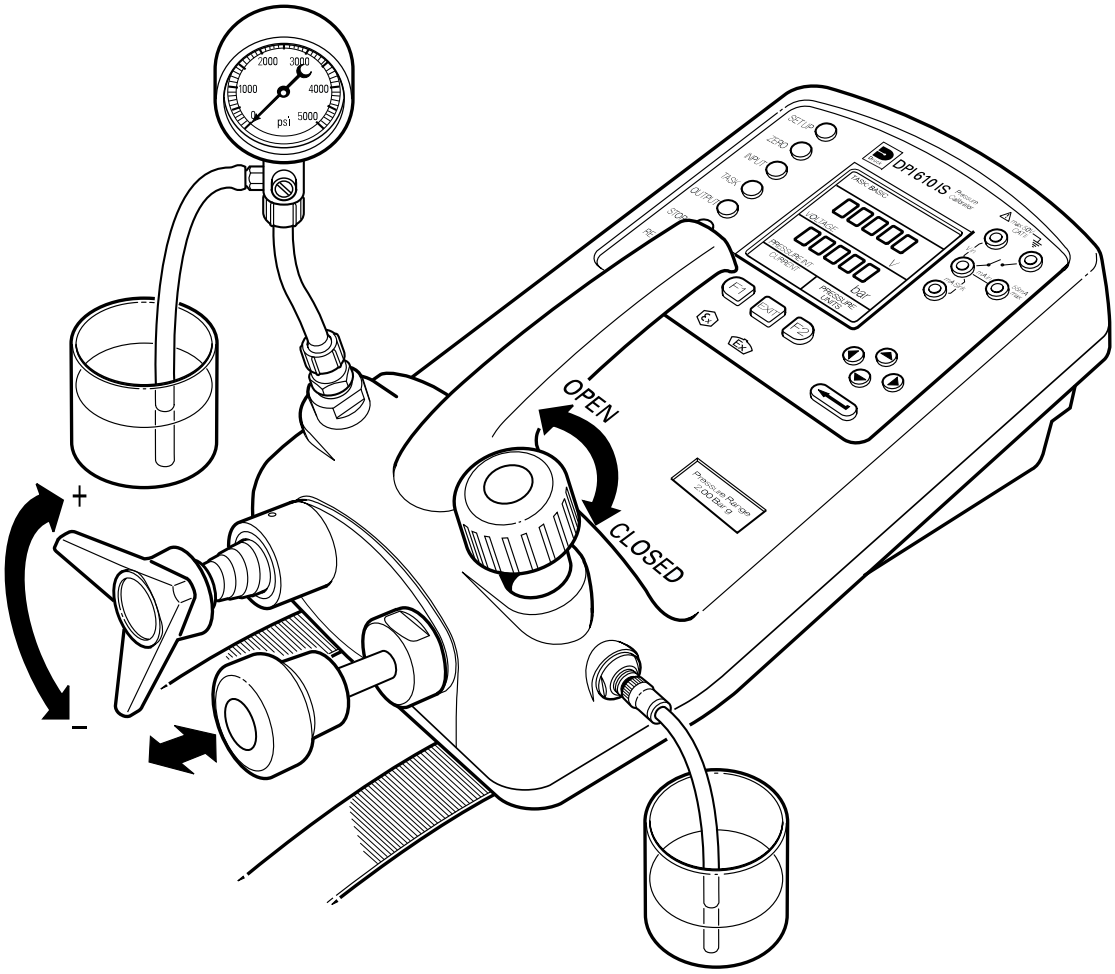


Figure A2 - Priming/Test Set-up

Bleeding the System

Before any measurements can be made , the hydraulic system needs to be primed and bled free of air. During the following operations, prepare for fluid spillage and provide a suitable receptacle for collecting the spillage.

(1) Prepare for use as detailed on page 39.

(2) Fill a suitable container with the required hydraulic fluid and place the priming inlet assembly hose into the fluid.

(3) Open the bleed valve on the Unit Under Test (UUT). If possible, fit a hose to the bleed point and place this in a container of the same fluid.

(4) Using the priming pump, pump hydraulic fluid into the instrument and the connected system. Monitor the hydraulic fluid level, ensuring that the priming hose stays below the fluid level and is not allowed to suck in air. Top up hydraulic fluid level as necessary.

(5) Continue use of the priming pump until only hydraulic fluid and no air is expelled from the bleed point.

(6) Close the bleed point when the priming pump is at the bottom of its stroke (fully pushed in) and slowly wind out the screwpress to its fullest extent to draw in further hydraulic fluid (approx. 7cc).

(7) Switch the instrument **ON** and, still using the priming pump, pressurise the system to approximately 2 bar.

(8) Close the isolation valve and remove the connection to the priming/fluid inlet port.

Operation

To obtain a pressure reading, proceed as follows.

(1) Switch the instrument **ON** and select the required **TASK**.

(2) Rotate the screwpress clockwise to increase the applied pressure.

Note: *When hydraulic fluid is compressed and flows through a restriction, there is an increase in temperature which, in turn, has an effect on pressure. Allow sufficient time for this pressure reading to stabilise before recording or logging a reading.*

(3) When the test is complete, reduce the pressure in the system to zero by turning the screwpress anticlockwise. Before disconnection of the UUT, open the isolation valve to bleed off any residual pressure.

(4) Remove the connection to the UUT and fit a blanking plug into the instrument's pressure port. Clean any spilt fluid off the instrument case.

Draining the Hydraulic Fluid

To drain the hydraulic fluid from the instrument, proceed as follows:

(1) Turn the isolation valve fully anticlockwise. Turn the instrument onto its left hand side (pressure port nearest to workbench). Place receptacle below the pressure port to collect hydraulic fluid.

(2) Drain the system by slowly winding in the screwpress and then depressing the priming pump plunger to express any fluid remaining in the instrument.

(3) If necessary, apply an air line to the priming fluid inlet to clear any remaining fluid out of the instrument.

Flushing - Replenishing or Changing the Hydraulic Fluid

If necessary, to remove any contaminants, flush out the hydraulic system as follows.

(a) Connect a priming hose assembly to the fluid inlet port and the pressure port as shown below

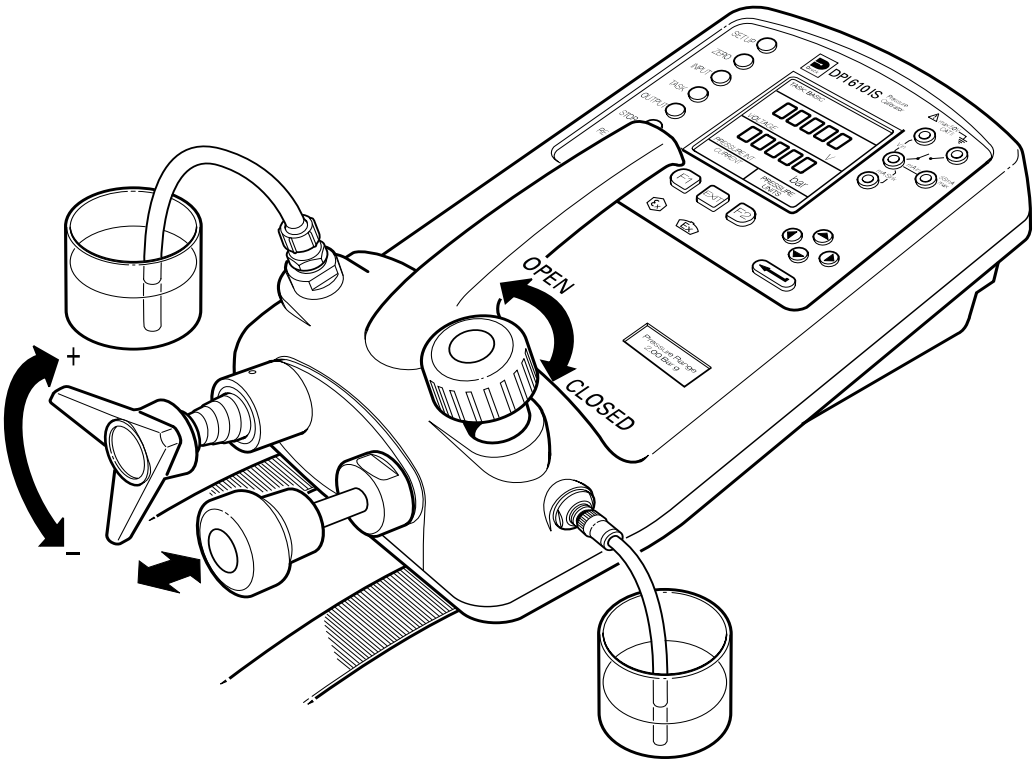


Figure A3 - DPI 610 HC - Flushing/Filling Connections

(b) Fill the priming fluid container with fresh hydraulic fluid of the required type. Using the priming pump, pump fresh hydraulic fluid through the system until clean hydraulic fluid, free of air bubbles, emerges into the container at the output port. Discard the contaminated fluid expressed during this process.

(c) Remove the hose located to the output port and, to prevent the ingress of any contaminant, fit a blanking plug in its place.

(d) Close the isolation valve and remove the priming fluid inlet hose from the priming inlet.

(e) Clean off any surplus oil which may have spilled onto the instrument casing.

The instrument is now ready for operation or storage. If storing, apply a label detailing the type of hydraulic fluid contained in the instrument. **For long term storage, it is recommended that the instrument be drained and stored empty.**

Notes

Appendix 2

BASEEFA
CERTIFICATE OF CONFORMITY

K239 Issue No. 2